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# The Journal of Applied Psychology


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# COLLEGE STUDENT PERSONNEL PROBLEMS

## II. The Analytical Study of the Student Personnel Problem[1]

R. A. BROTEMARKLE

*University of Pennsylvania*

The Student Personnel Problem may be viewed as one unitary problem or divided into a number of smaller problems. The former article has presented in detail the study of one of these problems, the individual mental testing. It is important to note in order the important phases of the larger problem. The following division is merely collective and indicative, and not in any way exhaustive.

### I. COLLEGE COURSE ACHIEVEMENT LEVEL

The all important factor of academic success is usually rated upon the basis of the College grades. Numerous systems of grading are in use, none of which is perfectly satisfactory. Certainly any measure used must be considered in terms of the marks and hour-unit quotient. In this way a (1) General Grade Rating may be attained.

In many cases an analysis of the student's record into groups or phases of interest and emphasis is of great value. The most acceptable grouping is a three-fold one. First, the Language group; second, the Science group; and third, the Historic-Social group. These groups may be sub-divided when necessary. In this way a (2) Specific Study Rating may be attained.

[1] The first part of this article appeared in the December, 1927, issue of this Journal.

### II. COLLEGE ADMISSION ANALYSIS

The above analysis is transferable to the previous records of the student in preparatory work. The evaluation is more difficult, but should be made in a form comparable to the College Grades if possible.

In many individual cases the trend of success in specific groups of studies will be readily observed.

### III. HEREDITARY FACTORS

Three specific phases of this enormous field have been chosen for emphasis. (1) The Racial Stock or Nationality of the parentage is traced through the grand-parents at least. (2) The Disease and Defect factors of the family backgrounds are noted. (3) The Constitutional Health and Developmental Schedule of the Student is portrayed.

Other specific problems may be studied as circumstances indicate their importance for the individual problem.

### IV. ENVIRONMENTAL TRAINING FACTORS

Four such factors are noted in detail. (1) The Home and Neighborhood Conditions are analyzed. (2) An Educational Rating of the Parents is secured. (3) The Home Library and Reading equipment is studied. (4) The High School or Preparatory and Grade Schools are rated as such, and the student's standing in the various school-levels of achievement estimated.

The early training of the individual is of great importance in the problem of future scholastic activity and pursuit.

### V. ECONOMIC FACTORS

The specific problems here studied are (1) The Parental Factors, and (2) The Student Factors. The comparative income and expenditure are checked upon by two factors: (3) a Student Self-Rating of Economic Circumstances and Attitudes, and (4) a Student Sample-Expenditure sheet of necessities, educational materials and luxuries.

The great problems of educational expense and student-employment are no little part of the main problem of academic failure or success.

### VI. THE SOCIAL FACTORS

Two distinct problems of great disparity are here noted: (1) The Family Social Status in the Home Community, and (2) The Student Social Status at College. The former may be estimated basicly from the (a) Parent's Occupation rating, and further analyzed by a (b) Rating of the Social Standing of the Family in the Community. Community social study may be necessary to check upon the last factor. The Student Social Status is easily estimated from (a) the Student Membership in Organizations and Participation in Activities. However, a very definite analysis of the problem prompts (b) a Student Self-Rating and Analysis of Socio-Personality Desires and Interests.

### VII. GENERAL INTELLIGENCE RATING

The General Intelligence factor is easily rated by numerous group tests of a Verbal or Non-verbal type. Perhaps the most definitely standardized at the College Level is the Scholastic Aptitude Test of the College Entrance Board. Certain other such series are used by various groups of Colleges in limited areas of the country.

### VIII. SPECIFIC MENTAL ABILITIES RATING AND ANALYSIS

This problem has been studied in the former article; however, certain details may be noted. (1) A General Mental Competency Rating may be made from a series or battery of individual tests. The Competency Study of Fifty College Students by K. G. Miller is such an attempt. The Mentalgraph Types study of the author is another development of such an approach.

(2) The Specific Mental Ability Rating and Analysis for Specific Abilities and Defects is of utmost importance. Upon

such a basis only may one hope to develop a diagnostic-teaching program for the individual and curriculum.

### IX. TEMPERAMENT AND EMOTIONAL RESPONSE RATING

Numerous tests and rating materials are now available; the following were chosen largely because of their adaptability to the clinical analysis. (1) The Total Affectivity and Total Idiosyncrasy Rating were secured from the Pressey X-O Tests for Investigating the Emotions, Form A. The following analysis may be made from the separate tests: (a) Test I—The Affective Spread, revealing an emphasis or spread of Disgust, Fear, Sex, and Suspicion factors. (b) Test II—Free Associational Relationships, which may be investigated upon the basis of the previous work of Jung, Kent, Rosanoff and others. (c) Test III—Moral Discrimination and Experience, which may be studied for trends in former experience and reactions. (d) Test IV—Temperament Spread, which may reveal an emphasis or spread of Paranoid, Neurotic, Shut-in, Melancholic or Hypochondriacal tendencies.

(2) The Will-Temperament Profile may be secured from the Downey Tests, with the opportunity of investigating the Speed of Movement, Freedom from Load, Flexibility, Speed of Decision, Motor Impulsion, Self-confidence, Non-Compliance, Finality of Judgment, Motor Inhibition, Interest in Detail, Coördination of Impulse, and Volitional Perseveration as specific factors. The type form of combination or grouping of the varied factors of Speed, Aggressiveness and Persistence may also be indicated.

(3) The Emotional Response Profiles may be obtained from the Brotemarkle Comparison Tests. A total deviation rating indicates the variation from the normal or standard reaction backgrounds. The specific levels of extreme deviation denoting the defects in Emotional Response may be obtained in the individual tests: Basic Moral Judgment, Reaction Profile, Emotional Reaction, Expressive-Regressive Attitude, Relational Adjustment, Underlying Feeling-Emotive and Resultant Orientation.

### X. STUDENT VOCATIONAL INTERESTS

(1) The Vocational Interests may be rated upon the basis of some such Interest Chart as that of Freyd. Further analysis may be made upon the backgrounds of the Barr Scale for Rating of Occupational Status, the Taussig Occupational Groupings or the Fryer Groupings.

(2) A Student Self-Rating of Vocational Interests may be obtained by numerous devices, descriptive terms and a point-scale being especially helpful in directing the attention of the individual. A check may be made through a history of childhood and adolescent activities and interests. A further aid may be the same form of self-analysis for Hobbies, and a check made through childhood and adolescent activities.

### THE STUDENT PERSONNEL RECORD

The Revised Form of the Student Personnel Record contains space for recording the entire problem and the analysis of the same. It is based largely upon the analysis of the Personnel Problem as presented, with ample space for the recording of such further specific examinations as may be deemed advisable. The Student Personnel Record is printed on single eight and one-half by eleven ($8\frac{1}{2}$ by 11) sheets and fastened with a clip for convenience. Specific factors of the record are found on single, or, in some cases, consecutive sheets.

Sheet 1 contains a summary of the Present Problem, indicating the immediate difficulty of the individual. The symbols G-P refer to General Probation. A student is placed on General Probation for the ensuing term as a result of having failed in a prescribed proportion of his work. His roster is limited to the minimum of required units and he is required to clear his record by re-examinations or the repetition of the subjects in course.

Sheets 2 and 3 contain the History of the Individual. The Educational History is obtained from the records of the Office of Admission and Office of the College. The symbols S.A.T. are for the Scholastic Aptitude Test of the College Entrance

Board. The Medical History is obtained from records of the Department of Physical Education, the Department of Hygiene and from the Student Personnel Questionnaire.

Sheet 4 contains the Family History. The Social and Economic histories are taken from the Student Personnel Questionnaire. The Family History is also obtained from the Questionnaire; but may be amplified or checked upon through reports from individuals or agencies, or by expert social investigation of the home and community.

Sheets 5 and 6 contain the examination records in the form of scores, results, reactions and analysis of the same. It is obtained primarily through clinical examination and testing. The physical examination or specific parts of the same is given through the hearty coöperation of the specialists connected with the Department of Physical Education, the University Hospital Staff and the Medical College Faculty. Reports may also be obtained upon examinations by the "family" or "home" Physician or Specialist.

Sheet 7 contains the Summary of the Case Problem, the Diagnosis, the Prognosis, the Recommendations and the Follow-up Notes.

[Sheet 1]

STUDENT PERSONNEL RECORD

UNIVERSITY OF PENNSYLVANIA

(REVISED FORM)

Name..... Date.....
School..... Class.....
Course..... Age.....
Referred by.....
Because of.....
.....

I. PRESENT PROBLEM:
A. *Educational*
Probation in.....
.....

G-P ( ) .....

Inability to Do.....

.....

Lack of Application in.....

.....

Misconduct.....

.....

B. *Physical*

General Health.....

.....

Specific Defect.....

.....

C. *Social*

Mal-adjustment in:

1. College Activities.....

.....

2. Extra-Collegiate Activities.....

.....

D. *Economic*

Problem.....

.....

.....

[Sheet 2]

II. History of Individual

A. *Educational.*

*College Office Record*

Entered.....

Readmitted.....

| | D | G | P | N | F |
|---|---|---|---|---|---|
| Language.... | | | | | |
| Scientific.... | | | | | |
| Historic and Social..... | | | | | |
| Total..... | | | | | |

Probations: ..... ..... ..... ..... ..... .....

Conditions: ..... ..... ..... ..... ..... .....

School..... Certified.....

Class Standing.....

Examinations.....

Psychological Examination..... S.A.T.....%

PERSONALITY RATING BY PRINCIPAL OF SCHOOL

Industry ( )
Initiative ( )
Interest in scholastic work ( )
Ambition ( )
Native ability ( )
Personality ( )
Loyalty and coöperation ( )
Ability in spoken English ( )

B. *Medical*

Physical Report: Weight.....
Height.....
Build.....
Pubescent.....
General Health.....
.....
Specific Defects.....
.....

C. *Social*

Childhood.....
.....
Early Adolescence.....
.....

[Sheet 3]

HISTORY OF INDIVIDUAL 2

School Activities.....
.....
.....
College Activities.....
.....

D. *Economic*

Money earned during summer.....
Position during summer.....
Need for Year.....
Scholarship.....
(Family) (Friends) Aid.....
Income From Work.....
Position.....
No. of hours per week.....
*Special Arrangement*
Notes.....
.....
Student-Aid Loans.....
.....

*Type*.....
.....

[Sheet 4]

III. FAMILY HISTORY:
A. *Educational:*
F.....
M.....
( ).....  ( ).....
( ).....  ( ).....
B. *Physical:*
Nationality.....
F.....  M.....
Health.....  Health.....
Intellect.....  Intellect.....
Moods.....  Moods.....
Social Attitudes.....  Social Attitudes.....
C. *Social:*
Home: Necessities.....  Neighborhood:
Neatness.....  Type.....
Size.....  Rating.....
Parental  School:
Condition.....  Type.....
Parental Supervision.....  Rating.....
Home Library: Books.....
Periodicals.....
Rating.....
Family Standing in Community.....
Rating.....
Father's Position.....
Rating.....
D. *Economic:*
Income.....
By.....
Source.....
Community Reputation.....

[Sheet 5]

IV. EXAMINATION
A. *Mental:*
Mental-Graph Type:.....
Fundamental Abilities:  Complex Mental Processes:
.....%....  .....%....
.....%....  .....%....

.....%.... .....%....
.....%.... .....%....
.....%.... .....%....
.....%.... .....%....

*Performance Tests:*

Healy Con A.....% Healy Con B.....%
Witmer Cyl.....% Dearborn Fb, Ic.....%
Young Maze B.....% Healy Comp II.....%
Ferguson #4.....%.....
#5.....%.....
#6.....%.....

*Information*.....%.....
.....
*Motor Control*.....%.....
.....
Specific Defects.....
.....
Specific Abilities.....
.....
.....

[Sheet 6]

B. *Emotional:*

Affectivity..... Idiosyncrasy.....
.....% .....%
Emotional Response.....%.....
..... .....
..... ..... .....
..... .....
.....

C. *Behaviour:*

Moral Concepts..... Moral Judgment.....
Personal Response..... Test Response.....
Social Adjustment:.....
.....
Sociability .....Plus (.....) Minus (.....)
.....
.....

D. *Physical:*

General Examination.....
.....
..... By.....

Specific Defects.....
.....
..... By.....
.....
.....
..... By.....
.....
.....
..... By.....

E. *Vocational:*
Interest.....
.....
Abilities.....
.....

[Sheet 7]

V. SUMMARY

VI. DIAGNOSIS

VII. PROGNOSIS

VIII. RECOMMENDATIONS

IX. FOLLOW-UP NOTES

## THE STUDENT PERSONNEL QUESTIONNAIRE

The Student Personnel Questionnaire is presented in revised form with such scoring and evaluating helps as seem necessary for its use. The use of the Questionnaire material is dependent upon the experience of the examiner. A broad experience and good common-sense attitude are pre-requisite to its use. However, it has been found helpful to follow in most cases a common statistical approach, and the Five-point scale has been found most practical for student and examiner. Descriptive terms and phrases are used to assist the student in crystallizing his own ideas and evaluating the same. The Questionnaire is printed on eleven (11) eight and one-half by eleven ($8\frac{1}{2}$ by 11) sheets. The interpretations made are based upon the tables of distributions of the study presented in the

former article, and a year's experience in personnel practice with some four hundred more cases.

[Sheet 1]

## THE STUDENT PERSONNEL QUESTIONNAIRE

(REVISED FORM)

College Personnel Officer — University of Pennsylvania

Directions: Many of the following questions are quite personal: However they are of great importance in the study of the student personnel problem.

Read them through
Answer each question as frankly and fully as possible:

---

### I. Racial Stock (Nationality)

| *Paternal* | *Maternal* |
|---|---|
| Father: | Mother: |
| Nationality ( ) | Nationality ( ) |
| Where born ( ) | Where born ( ) |
| *Lived in: Rural ( ) | *Lived in: Rural ( ) |
| Town ( ) | Town ( ) |
| City ( ) | City ( ) |
| Father's father: | Mother's father: |
| Nationality ( ) | Nationality ( ) |
| Where born ( ) | Where born ( ) |
| *Lived in: Rural ( ) | *Lived in: Rural ( ) |
| Town ( ) | Town ( ) |
| City ( ) | City ( ) |
| Father's mother: | Mother's mother: |
| Nationality ( ) | Nationality ( ) |
| Where born ( ) | Where born ( ) |
| *Lived in: Rural ( ) | *Lived in: Rural ( ) |
| Town ( ) | Town ( ) |
| City ( ) | City ( ) |

*Check on following rating:
Rural: Population of 1,000 or less
Town: Population of 1,000 to 10,000
City: Population of 10,000 or more

---

[Sheet 2]

## II. Parental Factors

**Rate your parents on the following chart using (F) for father and (M) for mother. Put the (F) and (M) under the descriptive word which you feel most definitely characterizes them in the factor defined.**

| V. DECIDEDLY MORE THAN AVERAGE | IV. MORE THAN AVERAGE | III. AVERAGE FOR AGE | II. LESS THAN AVERAGE | I. DECIDEDLY LESS THAN AVERAGE |
|---|---|---|---|---|
| | | Health | | |
| Vigorous | Strong | Healthful | Weakly | Sickly |
| | | General knowledge | | |
| Intellectual | Well-read | Informed | Schooled | Read and write |
| | | Originality | | |
| Inventive | Resourceful | Think for self | Follow lead | Imitative |
| | | Permanency of moods | | |
| Moods seldom ever change quickly | Moods change rather slowly | Moods of joy and sadness more or less permanent | Moods change rather quickly | Moods alternate quickly |
| | | Sensitiveness | | |
| Most sensitive to approval or disapproval | More or less sensitive | Variable in same | More or less indifferent | Utterly indifferent to same |
| | | Sympathy and tenderness | | |
| Kind on principle | More than kind | Average kindness | Tendency not to sympathize | Tends to cruelty |
| | | Ambition | | |
| Great pride in work | Anxious to excel | Desire to excel | Weak in ambition | No pride in work |
| | | Conscientiousness | | |
| Does right on principle | Dependable | Conscientious | Not dependable | Does wrong for advantage |

[Sheet 3]

## III. Personal Health and Developmental Schedule

Born: Year ( ) Age ( )
Height: Feet ( ) Inches ( )
Weight: Pounds ( )
Build: (1) Stout ( ) Medium ( ) Slender ( )
(2) Heavy ( ) Medium ( ) Light ( )
Walked: Age ( )
Talked: ( )
Pubescent: ( )
Childhood diseases: Name.....
.....
.....
.....

| Serious illness: | Name | Age | Present result |
|---|---|---|---|
| | ..... | .... | ..... |
| | ..... | .... | ..... |

| Accidents: | Name | Age | Present result |
|---|---|---|---|
| | ..... | .... | ..... |
| | ..... | .... | ..... |

Permanent health defects:
Eyes ( ) Corrected with glasses ( )
Ears ( ) Corrected as near as possible ( )
Name others..... ....
.....
.....
Describe your own present health problem.....

---

Describe any past or present physical or mental problem of:

| Father | Brothers |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| Mother | Sisters |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

[Sheet 4]

## IV. Home Conditions and Neighborhood Ratings

Directions: Rate the home conditions in which you were reared on the following five-point scale, using the defining terms as closely as possible—or placing the rating where you think such terms would closely correlate with the conditions.

| | NECESSITIES | NEATNESS | SIZE | PARENTAL CONDITIONS | PARENTAL SUPERVISION |
|---|---|---|---|---|---|
| V. Superior | Have many luxuries | Arranged by servants | Spacious guest rooms | Live together, perfect harmony | Much time, intelligent interest |
| IV. Moderate | Have many extras | Tidy, one servant | Ample, one guest room | Live together, seldom differences | Home evenings, good books, etc. |
| III. Sufficient | Good and plain | Clean and neat | Roomy, couch bed | Separated, remarried or deceased, children with one | Mother, home discipline does not extend beyond home |
| II. Poor | Cheap and gaudy | Untidy and careless | Living room used for sleeping | Divorced, children away from parents | Indifferent; careless about influence |
| I. Inferior | Barely have essentials | Dirty | No living or dining room | Unfortunate, remarriages, etc., children maltreated | Lazy, shiftless, ugly toward children |

Directions: Check the words which characterize the community in which you lived: and then rate the community neighborhood in which you lived, on the following five-point scale.

Write explanation in detail of such factors as you desire.

| | | | | | |
|---|---|---|---|---|---|
| City (10,000 or more) | ( ) | Suburban | ( ) | Residential | ( ) |
| Town (1,000 to 10,000) | ( ) | City block | ( ) | Tenement | ( ) |
| Rural (Less than 1,000) | | Slum | ( ) | Apartment | ( ) |

| | *Factors to be considered* |
|---|---|
| V ( ) Superior | Health |
| IV ( ) Good | Civic pride |
| III ( ) Medium | Educational facilities |
| II ( ) Poor | Moral tone |
| I ( ) Inferior | Religious Tone |

[Sheet 5]

V. Educational Rating of Family

| | Grade School | | | | | | | | High School | | | | College | | | | Graduate Work | | | | Degree | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Years..... | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Father..... | | | | | | | | | | | | | | | | | | | | | | | | |
| Mother..... | | | | | | | | | | | | | | | | | | | | | | | | |

Indicate brother's(b) and sister's(s) schooling:

Age

——— — .....
——— — .....
——— — .....
——— — .....
——— — .....
——— — .....
——— — .....

VI. Rating of Home Library and Reading

Give a round number estimate of the number of books in your home ( )

Give a round number estimate of the percentage of the following type of books in the same:

| | % |
|---|---|
| Reference—dictionaries and encyclopedias | ( ) |
| Literature—complete sets of author's | ( ) |
| Literature—standard prose and poetry | ( ) |
| Modern novels | ( ) |
| Children's books | ( ) |
| Religious books | ( ) |
| Others—scientific, philosophical, etc. | ( ) |

Indicate journals and periodicals read in your home:

..... .....
..... .....

..... .....
..... .....

Indicate type of library convenient to your home: Public free ( )
Public pay ( )
School ( )
Church ( )

Indicate approximately the number of books borrowed from such libraries per year:
By family ( )
By you for your own reading ( )

[Sheet 6]

## VII. Rating of Your Grade School and High School and Your School Standing

Your grade school: *Rural ( )
Town ( )
City ( )

(*Use former population figures)

Rate grade school attended:
V—Superior ( )
IV—Good ( )
III—Medium ( )
II—Poor ( )
I—Inferior ( )

State grades repeated in grades: ( ) ( ) ( ) ( ) ( )

State your average standing in grade school in college grade terms:
Check:
D ( )
G ( )
P ( )

---

Number of years in high school ( ) Name.....
Numbers of years in preparatory school ( ) Name.....

| | Check: H.S. | P. |
|---|---|---|
| Rural | ( ) | ( ) |
| Town | ( ) | ( ) |
| City | ( ) | ( ) |

Rate high school attended:
V—Superior ( )
IV—Good ( )
III—Medium ( )
II—Poor ( )
I—Inferior ( )

Rate preparatory school attended:
( )
( )
( )
( )
( )

State your average standing in high school and preparatory school in terms of college grades:

| | Check: H.S. | P. |
|---|---|---|
| D ..... | ( ) | ( ) |
| G ..... | ( ) | ( ) |
| P ..... | ( ) | ( ) |

List your extra-curricular interests and activities in

| High School | Preparatory School |
|---|---|
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |
| ..... | ..... |

[Sheet 7]

## VIII. Economic Factors

(1) Parental economic factors:
  (A) State in round numbers the yearly income of parent ( )
  (B) State allowance made by parent to you for:
    Educational expenses ( )
    (Tuition, books, etc.)

(2) Student economic factors:
  (A) State in round numbers the amount you earned *last year* ( )
    During previous summer season ( ) Form of employment ( )
    During school year ( ) Form of employment ( )
    Amount of same used for:
      1. Educational expenses ( )
      2. Personal expenses ( )
  (B) State amount earned this past summer season ( )
    Form of employment ( )
  (C) State amount you expect to earn during the present school year ( )

Your present form of employment:
  Where.....
  Hours per week.....
  Arrangement of hours.....
  Salary.....

(3) Check terms which characterize your personal economic circumstance and attitudes:

| | | |
|---|---|---|
| Opulent | Generous | "Treater" |
| Moneyed | Hospitable | "Strapped" |

| | | |
|---|---|---|
| Well-to-do | Liberal | Beggarly |
| "Warm" | Open-handed | "Gyp" |
| Rich | Frugal | Cheap |
| Wealthy | Saving | "Skin-flint" |
| "Straightened" | Moderate | Miserly |
| "Narrow means" | Thrifty | "Bum" |
| "Hand-to-mouth" | Spender | "Dutch-treat-artist" |

---

(4) Give average amount you spend yearly for:

| | | |
|---|---|---|
| Shoes ( ) | School supplies ( ) | Movies ( ) |
| Hats ( ) | Books ( ) | Tobacco ( ) |
| Overcoats ( ) | | Candy ( ) (Soda, etc.) |

State thing upon which you spend most money per year.....
State thing upon which you spend least money per year.....

[Sheet 8]

## IX. Social Factors

(1) Family social status in home community.

(A) State father's profession or vocation.....

Give a 30 word description of same in terms of number of men employed, size of plant or organization, type of work, etc.

.....
.....

(B) Check terms which characterize family in community life:

| | | |
|---|---|---|
| "One of old families" | "Upper class" | "Home folk" |
| "New comers" | "Middle class" | "Community folk" |
| "Social leaders" | "Lower class" | "Church folk" |
| "Climbers" | "Professional class" | "Society folk" |
| | "Working class" | |

---

(2) Student social status at college:

(A) Extra curricular activities:

Name of Fraternity or Sorority: ( )

List other organizations and activities:

.....
.....
.....
.....

Name functions attended during year:

.....
.....
.....
.....

---

(B) Socio-personal analysis:

Check social preferences:

Like to be with people plus- ( )
Like to be alone minus- ( )

Do you want to be more active in social activities? Yes ( )
No ( )

| If yes! | If no! |
|---|---|
| What keeps you from same? | Why do you refrain from same? |
| Lack of money ( ) | Indifference ( ) |
| Lack of sociability ( ) | Lack of sociability ( ) |
| .....( ) | .....( ) |
| .....( ) | .....( ) |

[Sheet 9]

## X. Student Vocational Interests

A) *Rating of vocational interests*

State profession, vocation, calling or work which you want to do in the following order, using the defining sentences as closely as possible. If two or more vocations would fall under one heading place them there.

( ) V Thing think do best in for own advancement and for others. Become recognized in field. Become nationally known.

( ) IV Willing to do. Think make a career out of work. Become a specialist in same. Become known in own state and nearby.

( ) III Would accept. Feel that it would be a good life work, but put me on level with usual run of men in profession. Become known in own county.

( ) II Would feel that in this work could make a good living and support family in a small town way. Could not expect to be more than a committee man in community activities.

( ) I Would accept with reluctance. Would feel that life could hold no more than mere existence for self and family. Would feel that college training had been more or less wasted.

---

B) State the things which you made when a youngster: (1—12 years) (Kites, dolls, mud-pies, etc.).....
.....
.....
.....

State things you made in mechanical, manual training, domestic or arts classes in high school.....
.....
.....
.....

State things you have done during school terms and summer seasons since you have been in college.....
.....
.....
.....

[Sheet 10]

C) List your hobbies: Games, sports, amusements, etc. Rate them as nearly as possible on scale below. Where two or more fall under one set of defining terms place them there.

( ) V Greatest pleasure from. Give time during school terms and vacation to same. Spend some money on equipment. Have trained hard for. Would spend money on to perfect same.

( ) IV Get decided pleasure from playing same. Turn to same as relaxation and interested in to degree that would spend money on.

( ) III Get a medium amount of pleasure from same. Turn to it as a seasonal interest however, and would give a limited amount of time to same.

( ) II Have a little fun at same when have good companions. Play to be sociable. Tire of after a while.

( ) I Have a passing interest in. Interest is fleeting. Tire of same quickly. Would not go far to see or play in same.

---

D) State the things of which you have made collections:

| When: | How: | How much: |
|---|---|---|
| ..... | ..... | ..... |
| ..... | ..... | ..... |
| ..... | ..... | ..... |

What games did you play when a child: (1–12 years)

.....
.....
.....
.....

What games, etc., did you take part in in school:

.....
.....
.....
.....

What games, etc., have you played since in college:

.....
.....
.....
.....

---

I. Racial Stock or Nationality is transferred to the record sheet unrated. No individual or collective rating method has seemed of sufficient value to be used in its present form. The striking proportions of foreign-born parentage in certain racial groups will be readily noted. The factor is therefore not included in any statistical summary of the questionnaire, but weighted largely as a temperament background or interpretative basis.

II. Parental Factors of each parent may be rated on the five-point scale as charted in the Questionnaire. A Health rating is taken from the single column *Health*. The rating of Intellect is the average of the two columns, *General Knowledge* and *Originality;* the former a judgment of the mass content of information, the latter an interpretation of the use made of the intellect. The rating of Moods is the average of the columns, *Permanency of Moods* and *Sensitiveness;* the former a judgment of the relative variability of the external indications

of mood, and the latter an interpretation of the subjective effect of adverse environment. The rating of Social Attitudes is the average of the columns, *Sympathy and Tenderness*, *Ambition*, and *Conscientiousness;* this rating being an interpretation of the motivation of reactions to the environment.

The following tables of distribution show a wide range and well balanced variation:

HEALTH

| *Five-point rating* | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 21 | 7 | 28 |
| 4.5 | 12 | 17 | 29 |
| 4 | 25 | 42 | 67 |
| 3.5 | 42 | 41 | 83 |
| 3 | 40 | 46 | 86 |
| 2.5 | 11 | 14 | 25 |
| 2 | 2 | 4 | 6 |
| 1.5 | | 2 | 2 |
| Average | 3.6 | 3.5 | 3.5 |
| Sigma | 0.61 | 0.55 | 0.52 |

INTELLECT FACTOR

| *Five-point rating* | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 1 | 4 | 5 |
| 4.8 | 1 | 2 | 3 |
| 4.7 | 4 | 1 | 5 |
| 4.5 | 14 | 18 | 32 |
| 4.2 | 14 | 9 | 23 |
| 4 | 17 | 33 | 50 |
| 3.8 | 9 | 9 | 18 |
| 3.7 | 17 | 22 | 39 |
| 3.5 | 24 | 33 | 57 |
| 3.2 | 11 | 13 | 24 |
| 3 | 16 | 19 | 35 |
| 2.8 | 7 | 5 | 12 |
| 2.7 | 2 | | 2 |
| 2.5 | 10 | 5 | 15 |
| 2 | 4 | | 4 |
| 1.7 | 1 | | 1 |
| 1.5 | 2 | | 2 |
| Average | 3.5 | 3.7 | 3.6 |
| Sigma | 0.55 | 0.33 | 0.49 |

MOODS FACTOR

| *Five-point rating* | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 3 | 1 | 4 |
| 4.8 | 1 | 1 | 2 |
| 4.7 | 1 | 0 | 1 |
| 4.5 | 6 | 10 | 16 |
| 4.2 | 9 | 8 | 17 |
| 4 | 23 | 23 | 46 |
| 3.8 | 9 | 10 | 19 |
| 3.7 | 10 | 17 | 27 |
| 3.5 | 36 | 44 | 80 |
| 3.4 | | 1 | 1 |
| 3.2 | 20 | 19 | 39 |
| 3 | 23 | 19 | 42 |
| 2.8 | 3 | 9 | 12 |
| 2.7 | 3 | 3 | 6 |
| 2.5 | 4 | 2 | 6 |
| 2.2 | | 4 | 4 |
| 2 | 1 | | 1 |
| 1.5 | | 2 | 2 |
| Average | 3.4 | 3.5 | 3.4 |
| Sigma | 0.45 | 0.40 | 0.44 |

SOCIAL ATTITUDES FACTOR

| *Five-point rating* | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 10 | 6 | 16 |
| 4.8 | 10 | 5 | 15 |
| 4.7 | 6 | 5 | 11 |
| 4.5 | 10 | 15 | 25 |
| 4.3 | 4 | 4 | 8 |
| 4.2 | 16 | 21 | 37 |
| 4.1 | 2 | 2 | 4 |
| 4 | 30 | 48 | 78 |
| 3.9 | | 2 | 2 |
| 3.8 | 13 | 21 | 34 |
| 3.7 | 11 | 12 | 23 |
| 3.5 | 19 | 14 | 33 |
| 3.3 | 6 | 4 | 10 |
| 3.2 | 6 | 10 | 16 |
| 3.1 | | 1 | 1 |
| 3 | 11 | 1 | 12 |
| 2.8 | | 1 | 1 |
| 2.2 | | 1 | 1 |
| Average | 3.9 | 3.9 | 3.9 |
| Sigma | 0.45 | 0.35 | 0.40 |

III. The Personal Health and Developmental Schedule factors may be transferred direct to the History of the Individual as indicated in the Record Sheet. No statistical rating may be made, but an evaluation of personal proficiency is indicated in the sum total. The individual picture may also be combined with the parental and fraternal problems to form a basis for evaluation of the physiological and systemic backgrounds of temperament.

IV. The rating of the Home Conditions may be made upon a five-point scale as charted in the Questionnaire, and may be recorded as individual factors or averaged to give a total score. The following distribution indicates the range and variability of the individual factors. A definite family loyalty, especially among certain racial groups, brings about a high average for Parental Conditions and Supervision. It may also be noted that a superior rating is more vital in these factors; if indeed it is not preferable that one should have less of the former factors of physical significance and more of the personal contact.

HOME RATING FACTOR

| | M. | F. | T. | 5 | | | 4 | | | 3 | | | 2 | | | 1 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | M. | F. | T. | M. | F. | T. | M. | F. | T. | M. | F. | T. | M. | F. | T. |
| Necessities | | | | 21 | 14 | 35 | 69 | 100 | 169 | 62 | 59 | 121 | 0 | 0 | 0 | 2 | 0 | 2 |
| Average | 3.7 | 3.7 | 3.7 | | | | | | | | | | | | | | | |
| Sigma | 0.61 | 0.51 | 0.59 | | | | | | | | | | | | | | | |
| Neatness | | | | 21 | 7 | 28 | 54 | 77 | 131 | 73 | 84 | 157 | 1 | 2 | 3 | 0 | 0 | 0 |
| Average | 3.6 | 3.5 | 3.5 | | | | | | | | | | | | | | | |
| Sigma | 0.64 | 0.55 | 0.59 | | | | | | | | | | | | | | | |
| Size | | | | 31 | 32 | 63 | 91 | 107 | 198 | 24 | 27 | 51 | 2 | 1 | 3 | 0 | 1 | 1 |
| Average | 4.0 | 4.0 | 4.0 | | | | | | | | | | | | | | | |
| Sigma | 0.32 | 0.38 | 0.38 | | | | | | | | | | | | | | | |
| Parental conditions | | | | 68 | 80 | 148 | 80 | 80 | 160 | 6 | 11 | 17 | 1 | 2 | 3 | 0 | 0 | 0 |
| Average | 4.3 | 4.3 | 4.3 | | | | | | | | | | | | | | | |
| Sigma | 0.52 | 0.57 | 0.55 | | | | | | | | | | | | | | | |
| Parental supervision | | | | 77 | 81 | 158 | 60 | 88 | 148 | 16 | 3 | 19 | 0 | 2 | 2 | 1 | 0 | 1 |
| Average | 4.3 | 4.4 | 4.4 | | | | | | | | | | | | | | | |
| Sigma | 0.62 | 0.53 | 0.57 | | | | | | | | | | | | | | | |
| | | | | 28% | | | 53% | | | 18% | | | 0.8% | | | 0.2% | | |

The Neighborhood Ratings and Types are combined in the following table. The preponderance of Residential Types and Superior Ratings correlate with the Home Ratings.

NEIGHBORHOOD RATINGS

| | | *Male* | *Female* | *Total* | |
|---|---|---|---|---|---|
| 5 | Residential | 23 | 23 | 46 | |
| | Residertial City Block | 1 | | 1 | |
| | City Block | 5 | 2 | 7 | |
| | Suburban | 9 | 12 | 21 | |
| | Suburban Residential Apartment | | 1 | 1 | |
| | | 38 | 38 | 76 | 30% |
| 4 | Residential | 43 | 38 | 81 | |
| | Suburban Residential Apartment | | 2 | 2 | |
| | Suburban Residential | 6 | 4 | 10 | |
| | Suburban City Block | 1 | 2 | 3 | |
| | Apartment | 2 | 2 | 4 | |
| | City Block | | 1 | 1 | |
| | City Block Apartment | 2 | | 2 | |
| | Suburban City Block | 1 | | 1 | |
| | Tenement | | | | |
| | | 55 | 49 | 104 | 43% |
| 3 | Residential | 11 | 9 | 20 | |
| | Suburban Residential | 5 | | 5 | |
| | Suburban | 3 | 2 | 5 | |
| | Suburban City Block | | 1 | 1 | |
| | City Block Residential | 1 | | 1 | |
| | City Block | 8 | 10 | 18 | |
| | City Block Apartment | 3 | | 3 | |
| | Rural | 1 | 4 | 5 | |
| | | 32 | 26 | 58 | 23% |
| 2 | Suburban | 1 | 2 | 3 | |
| | City Block | 1 | | 1 | |
| | Apartment | 1 | | 1 | |
| | Rural | 3 | | 3 | |
| | Suburban Rural | 1 | | 1 | |
| | | 7 | 2 | 9 | 3% |
| 1 | Suburban Rural City Block | 1 | | 1 | |
| | Rural | 1 | | 1 | |
| | | 2 | | 2 | 1% |

V. The Educational Rating of the Family is transferred to the record by symbols or abbreviations. For individuals still in school an arrow indicates continuation. The following tables give the Academic Status of the Father and Mother:

ACADEMIC STATUS—FATHER

| | *Years* | *Male* | *Female* | *Total* |
|---|---|---|---|---|
| Graduate | 4 | 5 | 7 | 12 |
| | 3 | 16 | 8 | 24 |
| | 2 | 1 | 2 | 3 |
| | 1 | 2 | 4 | 6 |
| | | 24 | 21 | 45 |
| College | 4 | 15 | 14 | 29 |
| | 3 | 3 | 4 | 7 |
| | 2 | 3 | 8 | 11 |
| | 1 | 3 | 1 | 4 |
| | | 24 | 27 | 51 |
| High school | 4 | 29 | 44 | 73 |
| | 3 | 2 | 2 | 4 |
| | 2 | 9 | 6 | 15 |
| | 1 | 2 | 4 | 6 |
| | | 42 | 56 | 98 |
| Grades | 8 | 23 | 40 | 63 |
| | 7 | 2 | 1 | 3 |
| | 6 | 9 | 5 | 14 |
| | 5 | 2 | | 2 |
| | 4 | 1 | | 1 |
| | 3 | | | |
| | 2 | 1 | | 1 |
| | 1 | | | |
| | 0 | 1 | | 1 |
| | | 39 | 46 | 85 |

ACADEMIC STATUS—MOTHER

| | *Years* | *Male* | *Female* | *Total* |
|---|---|---|---|---|
| Graduate | 4 | | 1 | 1 |
| | 3 | | | |
| | 2 | 1 | 3 | 4 |
| | 1 | | 2 | 2 |
| | | 1 | 6 | 7 |

| | Years | Male | Female | Total |
|---|---|---|---|---|
| College | 4 | 9 | 6 | 15 |
| | 3 | 3 | 1 | 4 |
| | 2 | 3 | 18 | 21 |
| | 1 | 2 | 2 | 4 |
| | | 17 | 27 | 44 |
| High school | 4 | 49 | 43 | 92 |
| | 3 | 2 | 4 | 6 |
| | 2 | 7 | 14 | 21 |
| | 1 | 2 | 5 | 7 |
| | | 60 | 66 | 126 |
| Grades | 8 | 29 | 44 | 73 |
| | 7 | 5 | 2 | 7 |
| | 6 | 7 | | 7 |
| | 5 | | 1 | 1 |
| | 4 | 5 | 2 | 7 |
| | 3 | | | |
| | 2 | | | |
| | 1 | 2 | | 2 |
| | | 48 | 49 | 97 |

Where one desires to give a five-point rating to the Academic Status of the parents, a very significant condition arises, in that a quintile distribution of the status of Mother and Father reveal a necessity of separate standards for such a rating. The following table will show that to stand above the average of third rating, the Father must have completed two to four years more of academic training to receive an equal rating with the Mother. The superior ratings of the Father are skewed upward by the professional training courses required of men.

| Quintile | Father | Mother |
|---|---|---|
| 5th | Graduate 3–4 | College 3–4 |
| 4th | Graduate 1–2<br>College 2–3–4 | College 1–2 |
| 3rd | College 1<br>High school 1–2–3–4 | High school 1–2–3–4 |
| 2nd | Grade 8 | Grade 8 |
| 1st | Grade 1–7 | Grade 1–7 |

VI. The rating of the Home Library and Reading Equipment is based upon a purely arbitrary five-point scale. The average library contained approximately 300 books, with a list of from four to six standard periodicals. A weighting was added in favor of the library containing a fair proportion of Children's books, and Literary materials, as over against a loading of Modern Novels and Parental Professional materials. The following table is of normal range and variation.

HOME LIBRARY RATING

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 8 | 10 | 18 |
| 4+ | | 1 | 1 |
| 4 | 20 | 25 | 45 |
| 4− | | 1 | 1 |
| 3+ | 2 | 1 | 3 |
| 3 | 54 | 56 | 110 |
| 3− | 21 | 31 | 52 |
| 2+ | 7 | 9 | 16 |
| 2 | 25 | 26 | 51 |
| 2− | 4 | 2 | 6 |
| 1 | 6 | 8 | 14 |
| 1− | 1 | | 1 |

VII. The rating of the Grade Schools and High or Preparatory Schools is transferred to the record sheet under the Educational History of the individual as desired. It is of developmental importance, and affords a check of academic progress. The ratings as such are skewed to the upper three points of the scale almost entirely.

The rating of the Student Social Activity in High or Preparatory School is based also upon an arbitrary standard set for the five-point scale. An average or rating in both instances indicated participation in approximately two to four activities of an academic or sport nature and one or two social functions annually. The following tables are of a normal range and variation.

STUDENT HIGH SCHOOL SOCIAL ACTIVITIES

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 10 | 12 | 22 |
| 5− | | | |
| 4+ | 2 | 1 | 3 |
| 4 | 23 | 39 | 62 |
| 4− | | 1 | 1 |
| 3+ | 8 | 7 | 15 |
| 3 | 64 | 70 | 134 |
| 3− | 11 | 11 | 22 |
| 2+ | 1 | 1 | 2 |
| 2 | 15 | 12 | 27 |
| 2− | 3 | 1 | 4 |

VIII. The rating of the Economic Factors may be transferred to the record sheet as listed. The rating of the same on a five-point scale can be accomplished in terms of a rough quintile distribution. A striking contrast will be noted in the range of distribution in male and female remuneration for employment or income. Contrasts are also to be noted in allowances and expenditures for the male and female. The following tables are given solely to indicate these contrasts. The greatest significance is to be found in the individual study and check of each case problem. The averages given are quite deceptive and must be understood in the way of contrasts; the average is usually skewed upward above the actual or modal average by a few extreme cases.

PARENTS' INCOME

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $100,000 | 1 | | 1 |
| 80,000 | 1 | | 1 |
| 50,000 | 1 | | 1 |
| 35,000 | 1 | | 1 |
| 28,000 | 2 | | 2 |
| 25,000 | 4 | 1 | 5 |
| 20,000 | 2 | | 2 |
| 18,000 | | 1 | 1 |
| $10,000–15,000 | 14 | 14 | 28 |

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5,000– 9,000 | 27 | 14 | 41 |
| 2,000– 4,500 | 47 | 39 | 86 |
| 1,000– 1,800 | 10 | 6 | 16 |
| 200– 800 | 2 | 2 | 4 |
| Average | $8319.+ | $6084.+ | $7408.– |

PARENTS' ALLOWANCE TO STUDENTS—EDUCATIONAL EXPENSE

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $2,000 | 1 | | 1 |
| 1,500 | 1 | 3 | 4 |
| 1,200 | 1 | | 1 |
| 1,000 | 5 | 2 | 7 |
| 900 | 3 | | 3 |
| 800 | 2 | 4 | 6 |
| 750 | 3 | 5 | 8 |
| 700 | 2 | 2 | 4 |
| 650 | 1 | 1 | 2 |
| 600 | 6 | 6 | 12 |
| 550 | | 1 | 1 |
| 475 | 16 | 8 | 24 |
| 450 | 1 | 1 | 2 |
| 425 | 2 | | 2 |
| 400 | | 1 | 1 |
| 360 | 11 | 14 | 25 |
| 350 | | 2 | 2 |
| 325 | 4 | 14 | 18 |
| 320 | | 2 | 2 |
| 300 | 3 | 2 | 5 |
| 275 | 5 | 12 | 17 |
| 250 | 1 | | 1 |
| 200 | 1 | 2 | 3 |
| 170 | 2 | 2 | 4 |
| 150 | 1 | 1 | 2 |
| 125 | 1 | 1 | 2 |
| 110 | | 1 | 1 |
| 100 | 4 | | 4 |
| 60 | | 5 | 5 |
| 50 | | 2 | 2 |
| 20 | 1 | 7 | 8 |
| | 1 | 1 | 2 |
| Average | $509 | $411+ | $465 |

ALLOWANCE TO STUDENTS—PERSONAL EXPENSE

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $5,000 | 1 | | 1 |
| 2,000 | 2 | 2 | 4 |
| 1,800 | | 1 | 1 |
| 1,500 | 3 | 1 | 4 |
| 1,200 | 6 | | 6 |
| 1,150 | | 1 | 1 |
| 1,000 | 5 | 3 | 8 |
| 950 | 1 | | 1 |
| 900 | 2 | 1 | 3 |
| 800 | 5 | 4 | 9 |
| 750 | 1 | 3 | 4 |
| 700 | 4 | 4 | 8 |
| 650 | 4 | | 4 |
| 600 | 7 | 8 | 15 |
| 550 | 1 | 1 | 2 |
| 500 | 9 | 14 | 23 |
| 450 | | 1 | 1 |
| 425 | 1 | | 1 |
| 400 | 5 | 7 | 12 |
| 350 | 1 | 1 | 2 |
| 300 | 7 | 4 | 11 |
| 250 | 1 | 4 | 5 |
| 200 | 7 | 16 | 23 |
| 180 | 1 | 3 | 4 |
| 150 | 4 | 4 | 8 |
| 125 | 2 | 2 | 4 |
| 100 | 3 | 4 | 7 |
| 75 | 2 | | 2 |
| 60 | | 1 | 1 |
| 50 | 2 | 1 | 3 |
| Average | $643 | $482 | $560 |

STUDENT INCOME

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $4,000 | 1 | | 1 |
| 1,000 | 1 | | 1 |
| 1,600 | 1 | | 1 |
| 1,500 | 2 | | 2 |
| 1,300 | | 1 | 1 |
| 1,200 | 5 | | 5 |
| 1,000 | 4 | | 4 |

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 900 | 1 | | 1 |
| 850 | 1 | 1 | 2 |
| 800 | 7 | | 7 |
| 700 | 5 | | 5 |
| 650 | 1 | | 1 |
| 625 | 1 | | 1 |
| 600 | 1 | | 1 |
| 540 | | 1 | 1 |
| 500 | 11 | 1 | 12 |
| 480 | 1 | | 1 |
| 450 | 2 | 1 | 3 |
| 400 | 6 | | 6 |
| 350 | 3 | 1 | 4 |
| 300 | 10 | 4 | 14 |
| 250 | 2 | 4 | 6 |
| 240 | 3 | | 3 |
| 220 | 1 | 1 | 2 |
| 200 | 11 | 11 | 22 |
| 175 | 3 | | 3 |
| 150 | 3 | 7 | 10 |
| 125 | 1 | 1 | 2 |
| 100 | 8 | 9 | 17 |
| 80 | | 3 | 3 |
| 75 | 1 | 2 | 3 |
| 60 | | 1 | 1 |
| 50 | 2 | 3 | 5 |
| 25 | 1 | 3 | 4 |
| 20 | 1 | 1 | 2 |
| Average | $523 | $200 | $406 |

STUDENT'S OWN PERSONAL EXPENSE

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $2,000 | 1 | | 1 |
| 1,000 | 1 | | 1 |
| 900 | 1 | | 1 |
| 750 | 1 | 1 | 2 |
| 700 | 2 | | 2 |
| 600 | 2 | | 2 |
| 500 | 8 | | 8 |
| 475 | 1 | | 1 |
| 450 | 1 | | 1 |
| 400 | 4 | | 4 |
| 350 | 3 | 1 | 4 |

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 300 | 6 | 2 | 8 |
| 250 | 3 | | 3 |
| 240 | 1 | | 1 |
| 200 | 16 | 7 | 23 |
| 150 | 5 | 4 | 9 |
| 125 | 2 | 2 | 4 |
| 100 | 13 | 10 | 23 |
| 75 | 3 | 5 | 8 |
| 50 | 6 | 6 | 12 |
| 25 | 1 | 4 | 5 |
| 20 | 2 | 1 | 3 |
| Average | $285 | $133 | $233+ |

STUDENT'S OWN EDUCATIONAL EXPENSE

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| $1,000 | 1 | | 1 |
| 800 | 3 | | 3 |
| 750 | 1 | | 1 |
| 600 | 2 | | 2 |
| 500 | 5 | | 5 |
| 400 | 6 | 1 | 7 |
| 350 | 6 | | 6 |
| 325 | 2 | | 2 |
| 300 | 6 | 4 | 10 |
| 265 | | 1 | 1 |
| 250 | 3 | 1 | 4 |
| 220 | 2 | | 2 |
| 200 | 9 | | 9 |
| 150 | 3 | 2 | 5 |
| 100 | 8 | 9 | 17 |
| 80 | 1 | 3 | 4 |
| 75 | 2 | 1 | 3 |
| 50 | | 4 | 4 |
| 40 | 1 | 1 | 2 |
| 25 | | 3 | 3 |
| 20 | 1 | 1 | 2 |
| 15 | 1 | 1 | 2 |
| Average | $312 | $124 | $248+ |

MEN—EDUCATIONAL MATERIALS

| | | | |
|---|---|---|---|
| $125 | 1 | $40 | 16 |
| 110 | 1 | 35 | 12 |
| 100 | 7 | 32 | 1 |

| | | | |
|---|---|---|---|
| 85 | 3 | 30 | 15 |
| 80 | 4 | 28 | 2 |
| 75 | 2 | 27 | 1 |
| 70 | 1 | 26 | 1 |
| 65 | 2 | 25 | 12 |
| 61 | 1 | 20 | 5 |
| 60 | 6 | 18 | 1 |
| 55 | 4 | 15 | 4 |
| 53 | 1 | 5 | 1 |
| 50 | 14 | | |
| 45 | 6 | Average | $10+ |

WOMEN—EDUCATIONAL MATERIAL

| | | | |
|---|---|---|---|
| $200 | 1 | $40 | 18 |
| 125 | 1 | 36 | 1 |
| 110 | 1 | 35 | 15 |
| 105 | 1 | 33 | 1 |
| 80 | 2 | 32 | 1 |
| 75 | 3 | 30 | 18 |
| 70 | 1 | 27 | 1 |
| 69 | 1 | 25 | 14 |
| 65 | 2 | 23 | 1 |
| 60 | 3 | 20 | 9 |
| 55 | 6 | 17 | 1 |
| 53 | 1 | 15 | 5 |
| 52 | 1 | 13 | 2 |
| 50 | 14 | 10 | 1 |
| 45 | 3 | | |
| 43 | 1 | Average | $12+ |
| 42 | 1 | | |

MEN—LUXURIES

| | | | |
|---|---|---|---|
| $470 | 1 | $48 | 1 |
| 350 | 1 | 45 | 5 |
| 240 | 1 | 42 | 1 |
| 150 | 3 | 40 | 7 |
| 140 | 3 | 37 | 1 |
| 135 | 1 | 35 | 3 |
| 130 | 1 | 31 | 1 |
| 125 | 3 | 30 | 4 |
| 105 | 1 | 25 | 5 |
| 100 | 3 | 24 | 1 |
| 95 | 1 | 20 | 7 |

| | | | |
|---|---|---|---|
| 92 | 1 | 19 | 1 |
| 90 | 1 | 18 | 1 |
| 85 | 1 | 15 | 7 |
| 80 | 3 | 12 | 1 |
| 78 | 1 | 11 | 1 |
| 75 | 7 | 10 | 4 |
| 73 | 1 | 9 | 1 |
| 72 | 1 | 8 | 1 |
| 70 | 2 | 6 | 1 |
| 67 | 2 | 5 | 1 |
| 65 | 5 | 2 | 1 |
| 60 | 6 | 1 | 1 |
| 55 | 9 | | |
| 50 | 9 | Average | $30+ |

WOMEN—LUXURIES

| | | | |
|---|---|---|---|
| $145 | 1 | $20 | 14 |
| 125 | 1 | 18 | 1 |
| 114 | 1 | 17 | 2 |
| 105 | 1 | 15 | 9 |
| 100 | 1 | 14 | 1 |
| 90 | 2 | 13 | 1 |
| 70 | 1 | 12½ | 1 |
| 60 | 1 | 12 | 1 |
| 50 | 5 | 11 | 2 |
| 45 | 3 | 10 | 17 |
| 41 | 1 | 7 | 1 |
| 40 | 5 | 5 | 11 |
| 35 | 7 | 3 | 3 |
| 30 | 7 | 2 | 1 |
| 27 | 1 | 1½ | 1 |
| 25 | 7 | 1 | 2 |
| 23 | 1 | | |
| 22 | 1 | Average | $11+ |

MEN'S CLOTHES

| | | | |
|---|---|---|---|
| $400 | 1 | $76 | 1 |
| 270 | 1 | 75 | 6 |
| 215 | 1 | 72 | 1 |
| 200 | 2 | 70 | 1 |
| 186 | 1 | 68 | 2 |
| 185 | 1 | 67 | 1 |

| | | | |
|---|---|---|---|
| 180 | 1 | 65 | 6 |
| 175 | 1 | 64 | 1 |
| 165 | 1 | 63 | 1 |
| 162 | 1 | 60 | 1 |
| 160 | 1 | 58 | 1 |
| 158 | 1 | 56 | 1 |
| 151 | 1 | 55 | 7 |
| 150 | 2 | 53 | 1 |
| 145 | 2 | 52 | 2 |
| 135 | 2 | 50 | 5 |
| 126 | 1 | 48 | 3 |
| 125 | 2 | 47 | 3 |
| 120 | 2 | 46 | 1 |
| 117 | 1 | 45 | 3 |
| 115 | 3 | 43 | 1 |
| 112 | 2 | 41 | 2 |
| 110 | 1 | 40 | 5 |
| 105 | 3 | 37 | 1 |
| 102 | 1 | 35 | 1 |
| 100 | 5 | 31 | 1 |
| 99 | 1 | 28 | 1 |
| 95 | 3 | 27 | 1 |
| 90 | 5 | 21 | 1 |
| 88 | 2 | 20 | 1 |
| 87 | 1 | 13 | 1 |
| 85 | 4 | 12 | 2 |
| 84 | 2 | | |
| 80 | 6 | Average | $48+ |
| 77 | 2 | | |

Women's Clothes

| | | | |
|---|---|---|---|
| $850 | 1 | $125 | 2 |
| 650 | 1 | 122 | 1 |
| 450 | 1 | 120 | 3 |
| 400- | 2 | 115 | 1 |
| 380 | 1 | 110 | 7 |
| 375 | 1 | 105 | 1 |
| 350 | 2 | 100 | 6 |
| 340 | 2 | 95 | 4 |
| 325 | 1 | 90 | 4 |
| 320 | 1 | 85 | 6 |
| 300 | 3 | 83 | 1 |
| 295 | 1 | 80 | 3 |

| | | | |
|---|---|---|---|
| 290 | 1 | 75 | 4 |
| 285 | 2 | 70 | 1 |
| 275 | 1 | 68 | 1 |
| 270 | 1 | 67 | 1 |
| 260 | 3 | 65 | 2 |
| 250 | 2 | 60 | 3 |
| 235 | 2 | 58 | 1 |
| 230 | 3 | 52 | 1 |
| 225 | 1 | 50 | 3 |
| 220 | 1 | 47 | 1 |
| 215 | 2 | 45 | 2 |
| 212 | 1 | 44 | 1 |
| 205 | 1 | 40 | 3 |
| 200 | 3 | 39 | 1 |
| 190 | 1 | 36 | 1 |
| 180 | 1 | 35 | 2 |
| 170 | 2 | 32 | 2 |
| 165 | 2 | 30 | 1 |
| 160 | 1 | 25 | 1 |
| 155 | 6 | 24 | 1 |
| 150 | 3 | 21 | 1 |
| 140 | 7 | | |
| 135 | 2 | Average | $85+ |
| 130 | 4 | | |

IX. The Social Factors may be transferred in terms of the Questionnaire statement. A five-point scale may be used for the rating of the father's vocation. No single satisfactory scale having been evolved, the author in this study made use of a combined five-point rating scale defined by the combined Barr, Taussig and Freyer scales. The general scheme of the same expressed in terms of the Taussig scale places the "professional group" in the upper quintile; the "semi-professional and business groups" in the fourth quintile; the "skilled labor" in the middle quintile; the "semi-skilled and slightly skilled labor" in the second quintile; and the "common labor" in the lower quintile. Certain adjustments of the same were made by correlation with the Barr and Freyer scales.

VOCATIONAL RATING

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 45 | 46 | 91 |
| 4 | 44 | 50 | 94 |
| 3 | 32 | 48 | 80 |
| 2 | 14 | 6 | 20 |
| 1 | 9 | 7 | 16 |

The rating of the family backgrounds is made on an arbitrary five-point scale. A rating of five being given the "old families," "upper class" and "professional class"; a rating of four being given the "social leaders," the "home," "community," "church" and "society folk"; a rating of three being allowed "new comers" and the "middle class"; and a rating of two being assigned to the "climbers," "lower class" and "working class." An average of such ratings was used when more than one check was made.

The following table gives a range skewed to the upper point ratings:

PARENTS SOCIAL RATING

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 39 | 51 | 90 |
| 4 | 40 | 52 | 92 |
| 4— | 1 | 0 | 1 |
| 3— | 0 | 1 | 1 |
| 3 | 62 | 58 | 120 |
| 3 | 1 | 0 | 1 |
| 2 | 3 | 0 | 3 |

The Student Social activity at College may be transferred to the record in terms of the Questionnaire or may be evaluated on a five-point scale in terms of the arbitrary standard similar to the one used for the High or Preparatory School and activity rating. The average student in this study participated in one or two major activities, and two to four minor activities and functions.

The following is the table of Distribution:

STUDENT COLLEGE ACTIVITIES

| | *Male* | *Female* | *Total* |
|---|---|---|---|
| 5 | 6 | 9 | 15 |
| 5− | 1 | 0 | 1 |
| 4+ | 0 | 3 | 3 |
| 4 | 18 | 30 | 48 |
| 4− | 1 | 1 | 2 |
| 3+ | 3 | 7 | 10 |
| 3 | 53 | 62 | 115 |
| 3− | 21 | 16 | 37 |
| 2+ | 1 | 0 | 1 |
| 2 | 16 | 16 | 32 |
| 2− | 3 | 2 | 5 |
| 1 | 2 | 2 | 4 |
| 1− | 2 | 0 | 2 |

The Socio-Personal Analysis may be recorded in terms indicated in the Questionnaire and are not adaptable to a five-point rating. They are an important check against the social backgrounds of the individual's Questionnaire rating. A significant social concept is to be noted in the large number of individuals who feel that they would be capable of much more social activity had they the "money" to pay for participation in the same. The majority of individuals indicate the lack of "money" as the single social handicap.

## X. STUDENT VOCATIONAL INTERESTS

The vocational interest may be rated on a five-point scale against arbitrary standards. A comparison may be made with the parent's occupation if the individual's highest choice or greatest interest is rated on the five-point scale used for the former rating. The vocational interest of the student has been found of equal range with that of parental distribution, but has a skew to the highest quintile, being one point higher in average than the parental rating. The developmental factors involved in the vocational interests are largely indicative of the social

backgrounds of the student childhood. The rating of the Hobbies may be based upon arbitrary standards, and are largely indicative of the social backgrounds of the student adolescence.

The following table of distribution indicates the superior vocational interest of the student.

VOCATIONAL RATING OF THE STUDENT INTEREST

| | *Female* | *Male* | *Total* |
|---|---|---|---|
| 5 | 160 | 152 | 312 |
| 4 | 26 | 12 | 38 |
| 3 | 1 | | |
| 2 | 1 | | |

A summated Social Rating was the aim of the study so far as statistically possible. The method of securing the same was indicated in the previous article. The following table of distribution gives a normal distribution and variation for the same.

SOCIAL RATING

| *Sigma massed average rating* | *Cases* | *Sigma massed average rating* | *Cases* |
|---|---|---|---|
| 2.3 | 1 | 3.5 | 21 |
| 2.4 | 4 | 3.6 | 24 |
| 2.5 | 4 | 3.7 | 25 |
| 2.6 | 8 | 3.8 | 9 |
| 2.7 | 12 | 3.9 | 15 |
| 2.8 | 18 | 4 | 6 |
| 2.9 | 22 | 4.1 | 14 |
| 3 | 21 | 4.2 | 1 |
| 3.1 | 25 | 4.3 | 3 |
| 3.2 | 16 | 4.4 | 5 |
| 3.3 | 35 | 4.5 | |
| 3.4 | 35 | 4.6 | 3 |

The former study has already indicated the advisability of a common-sense clinical viewpoint in the interpretation of the Social factors as over against a too highly statisticised form of analysis. A year of practical use of the same in the solution of the student personnel problems has more than convinced the writer

of the reasonableness of the Questionnaire form for the securing of such information. The follow-up of conference and interview more than supply an ample check, and find their greatest usefulness in its previous statements and indications. By such means an intelligent approach may be made to the application of all factors in the problem to the individual case-problem, and individuals directed to their natural level of successful academic attainment, with a happier relation to their entire environment.

AUTHOR'S NOTE: The author desires to express his appreciation of the constructive criticism and advice, testing, scoring and statistical help rendered by colleagues in the Psychological Laboratory and Clinic at the University of Pennsylvania.

# A TECHNIQUE FOR PSYCHOLOGICAL STUDY OF POSTER BOARD ADVERTISING AND SOME PRELIMINARY RESULTS

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## INTRODUCTION

Most experiments on advertising psychology have been made in the laboratory using magazine advertisements or abstract material of some sort. The results of such experiments are obviously more applicable to magazine or newspaper advertising than to poster boards. However, a goodly sum of money is being expended in this last form of advertising and psychological problems are equally involved. We can of course use small size poster boards in the laboratory and present them at a greater distance from the observer than the ordinary tachistoscope or dummy magazine. But while some poster problems may be solved satisfactorily in this fashion there are undoubtedly factors which exist in the field that cannot be adequately touched in the laboratory. The actual poster board is observed under different conditions and in a different setting. The observer is usually in motion and there are distractions from the vehicle, intervening posts or trees, street noises or attractive scenery. The laboratory observer looking through a dummy magazine is not so very dissimilar to the ordinary individual in his living room reading his favorite periodical. But the person in the laboratory observing miniature poster boards differs considerably from one who is speeding along the boulevard. Thus it is desirable to study some of the problems *in situ*. The present article describes a technique that proved valuable for this purpose and gives a few typical results found therewith. The technique is not particularly novel or ingenious but the

writers have never seen an account of similar experiments and feel it worth while to call the attention of other experimenters to the possibilities of such a technique. It consisted merely of taking the observers by a series of poster boards at constant speed in an automobile and after a constant time interval using conventional procedures for recall and recognition. It was not feasible at the present time to conduct any very extensive experiments but things went far enough to show that the method had possibilities. However, some preliminary results are presented for what they are worth and to show the types of problems that may be attacked with this technique.

## MATERIAL

A set of 20 standard-size poster boards stood on one side of the street adjacent to one another in the outskirts of Columbus, Ohio. This will be called Set *A*. Another similar set of 21 boards was about three miles distant (Set *B*). Both sets were practically at the inner edge of the sidewalk and were contiguous, with no spaces between boards. Both streets had a car track running along the center but in the case of Set *A* the portion allotted to the track was elevated and separated from the rest of the street by a curbstone. This street was somewhat wider than that near Set *B*. Both streets were paved but the one at *A* was in poorer condition.

A seven passenger closed car made it possible to carry 6 observers simultaneously. The seats in the car were numbered,—1 was rear right, 2 rear center, 3 rear left, 4 folding right, 5 folding left, and 6 front right beside the driver. It was possible to see all the boards from every seat in the car.

The experimenter was provided with an up-to-the-minute list of all the commodities advertised on each set of boards together with an equal number of commodities not advertised on that set intermixed at random. This was for the recognition experiment.

Each observer was provided with pencil, paper and a lap board for writing.

METHOD

The first trial for a given group of observers was "naïf." They were told simply that they were to participate in a psychological experiment and no mention was made of advertising. A few had some suspicion as to the real purpose, others thought it might be something about traffic problems but the majority had no notion as to the nature of the experiment. They were assigned seats in the car, note made of their position and they were then driven by one set of boards at the rate of 20 miles per hour. They were taken further along the street out of sight of the boards and exactly five minutes after having left the last board given a recall test. They were told to write down all the posters they could recall having seen, noting particularly in each case if possible the commodity, nature of picture if any, slogan, trade mark or name, manufacturer or dealer and the outstanding color displayed. They were allowed five minutes for this recall. They were then told to go through what they had written and check every poster that they remembered having seen at some previous time prior to the experiment. This was to correct for familiarity. These papers were collected and the experimenter then read the list of commodities actually advertised on the boards with the irrelevant ones intermixed and the observers were required to write down those which they recognized as having been in the set just passed. The experimenter read a serial number with each commodity and the observers merely noted the numbers of the recognized ones on their blanks. They were instructed to work independently and were under the direct supervision of the experimenter in the automobile anyway. This same group of observers was then taken by the other set of boards. They were of course now "sophisticated" but otherwise the experiment was conducted in identical manner. Half the groups started with Set *A* and the remainder with Set *B*.

Several sources of difficulty in the technique deserve mention. The sophisticated series all had the benefit of practice. It was possible to give the naïf groups the different sets of boards and to take them along the street in different directions but

they could not be given practice and remain naïf. It was obviously necessary to give the naïf series first if it was to be naïf at all. Furthermore, the posters naturally differed in intrinsic merit from the attention or memory standpoint. If some particularly striking poster appeared in a certain position and received a high score it would be difficult to tell whether this was due to content or the position. This could be checked to some extent by passing the boards in both directions. Then if the experiment extended over a considerable length of time some of the posters would be changed. Of course it would be desirable to arrange the posters in specific orders as is done in a dummy magazine. The best that can be done in the present case is to amass a large amount of data and trust to the averages, changes in the posters and variation of direction to iron out the remaining errors.

The observers were university undergraduates. It was not always possible to get a car full and groups of 4, 5 and 6 were used,—19 observers in all. Each group did both sets of boards.

## RESULTS

Eight items of score were used,—the 6 items on which the observer was instructed to report (supra), the familiarity score and the recognition score. The original results were tabulated as follows. A single sheet was made out for each set or series, e.g., the group of 6 observers on Set *A*. The first row in the table gave results for the first poster in the set that the automobile passed. The columns of the table gave the successive items of score and each entry consisted of the seat number of the observer reporting that particular item of score. The following is the beginning of a typical table:

| POSTER NUMBER | COMMODITY | PICTURE | SLOGAN | TRADE NAME | DEALER | COLOR | FAMILIARITY | RECOGNITION |
|---|---|---|---|---|---|---|---|---|
| 1 | 2, 4, 5, 6 | 2, 5 | 5 | 2, 6 | 2 | 2 | 2, 4 | 1, 2, 4, 5, 6 |

For instance with poster no. 1, four observers (nos. 2, 4, 5 and 6) recalled the commodity, nos. 2 and 5 recalled the picture,

etc., two of them (nos. 2 and 4) recalled having seen this same poster on some occasion prior to the experiment and five of them recognized having seen it when the names of the commodities were read by the experimenter. Twenty or 21 rows like this would give the original data for a given group of observers on a certain set of posters. The experimenter of course had to revise the key by which he corrected the blanks as some of the posters were usually changed between experiments.

Given these various items of score it was necessary to combine them. The columns for trade name and for commodity were in general the ones with the largest number of entries. After various procedures were tried the following was adopted. For a given poster the number of entries in the first six columns were totalled, that is every mention by any observer of commodity, picture, slogan, trade name, manufacturer or color counted one point. This gave no allowance for familiarity. It was not desirable to weight this too heavily because of the frequent difficulty in actually recalling whether that advertisement had been seen previously on a poster or in some other medium. Consequently the number of entries in the familiarity column was divided by 2 and subtracted from the previous total. This remainder was then divided by the number of observers in that series to get the score per observer. As a matter of fact the inclusion of allowance for familiarity in the score did not make a great deal of difference. The scores with and without this allowance were correlated (products-moments) and the coefficient was $0.98 \pm 0.01$. For instance in the excerpt from the table given above the entries in the first six columns would total 11 (each entry is merely the seat number and counts only 1), there are two entries in the familiarity column so half of this is 1 and the weighted score is thus $11 - 1$ or 10. This was then divided by 6, the number of observers, giving 1.66. This was the recall score for the first poster. Similar scores were worked out for the other posters. It was decided to evaluate the recognition results entirely separately because of the frequent suggestion that the recognition method is a better indication of attention value of an advertisement while the other is

a better index of its memory value.[1] They were reduced similarly to terms of score per observer.

One expedient was adopted in the present instance in order to make it possible to average results on the two sets of boards. There were 20 in one set and 21 in the other. The middle one of the latter was dropped so that both sets of data contained twenty posters. This would probably not be done in a more extensive experiment but in the present case the small number of observers made it necessary in order to get an appreciable number into the averages.

### *Primacy and recency*

The data were analyzed first from the standpoint of primacy and recency. Experiments with magazine dummies and advertising sections of magazines have shown the higher value of advertisements at the beginning or end or near those positions while advertisements in the central portion are less effective. A similar problem exists with reference to a set of posters. It was merely necessary to plot curves with the successive boards on the abscissa and recall or recognition value on the ordinate. This is done in figure 1. The lower curves are for recall,—the weighted scores above mentioned,—and the upper for recognition. The data were first grouped according to the sets of posters and the groups on set *A* averaged together and a curve plotted. A similar curve was plotted for set *B* of boards. These curves were quite similar and are not included in the chart. The average curve obtained from them is of course the same as the average curve shown. It proved more interesting to plot separately the naïf and the sophisticated series. The four naïf series were averaged to give the one curve and the four sophisticated to give the other. An average curve based on all the results is also given.

All the curves for recall show very definitely the effects of recency. This probably is not due to actual content of the advertisements because the same thing is found no matter from

[1] Cf. Poffenberger, A. T., Psychology in Advertising, p. 197.

which direction the observers pass. With reference to primacy the results are not so clear. When the observers are sophisticated the curve is fairly high for the first third or so of the posters and then drops, finally rising toward the end. When the observers are naïf, except for the very first poster, the first third is rather low. Then the curve runs higher in the middle,

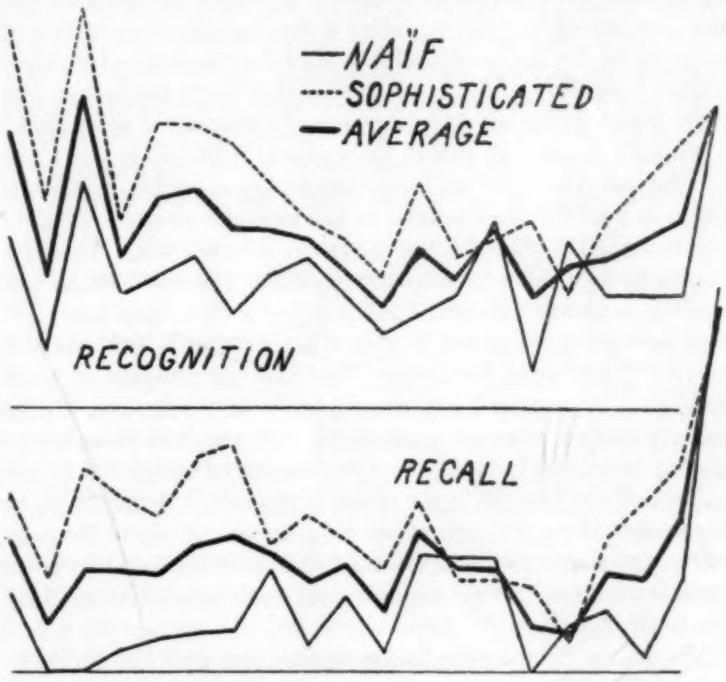


FIG. 1

dropping again somewhat and finally rising at the end. The average curve gives a combination of these trends and the result is a rather uniform value throughout with the exception of the rise at the end.

It would of course be rash to draw final conclusions from this amount of data but if subsequent experiments give similar

results it will be rather suggestive. For instance in laboratory studies the observers know what is coming and are somewhat analagous to our sophisticated observers. However our naïf group is quite different and their results likewise differ markedly from the conventional findings. It is tempting to speculate on these differences. When the observer is aware he is to be questioned upon the advertisements he begins to note them at the very outset. However, after a time his attention begins to lapse or he begins to get inhibitions from those already seen. Then at the very end the realization that there are only a few more quickens the attention again or the absence of subsequent inhibition during the period after observation raises the score for the last few. The naïf observer on the other hand does not begin to note the boards until he has passed a number and gets the cumulative effect of the marginal stimulation. Then he begins to note them. Later this palls but the approach of the end has somewhat the same effect it had in the other case. If this speculation is sound it puts a little different light on the matter of preferred positions. The average prospect is more analogous to our naïf observers and it would look as if the initial positions were not so effective. Of course in an ordinary display prospects pass in both directions so an end board would about half the time have the effect of recency. However there are boards along the side of one-way streets or where through traffic is for the most part routed in one direction. In such cases it would seem that the last ends were more effective than the first ends.

The curves for the recognition method are given in the same figure. The sophisticated one is rather similar to the recall curve except that the final rise is not as great,—in fact does not come up to the level of the initial portions of the curve. The naïf curve shows a slight indication of primacy but is at a rather uniform level throughout until the final rise.

If the recognition method is more of a measure of attention value it would seem that this value of the first boards is especially good in the case of the sophisticated observers but drops off considerably until near the end, while with the naïf

attention is fairly uniform throughout with a considerable increase at the end. These results would in general corroborate the conclusions drawn above with reference to the recall curves.

*Side of the street*

In one series the observers were driven along the opposite side of the street from the posters and in the opposite direction. The distance from the posters was greater and there was more intervening distraction while on the other hand the visual angle was wider and more posters could be seen at a given instant without turning the head. It is possible to make a rough evaluation of this factor by considering each series of this sort in comparison with the results of another group of observers

TABLE 1

| | SAME SIDE | | OPPOSITE SIDE | | PER CENT DIFFERENCE | |
|---|---|---|---|---|---|---|
| | Recall | Recognition | Recall | Recognition | Recall | Recognition |
| Naïf | 0.287 | 0.18 | 0.436 | 0.27 | 52 | 50 |
| Sophisticated | 0.674 | 0.47 | 0.780 | 0.46 | 16 | −2 |
| Average | 0.480 | 0.33 | 0.608 | 0.36 | 34 | 24 |

on the same street in the same condition of naïvete or sophistication. Such a comparison is made in table 1. Each entry is the average of the 20 posters and the 4 to 6 individuals constituting the group in question. For instance if we had a recall and recognition curve like those of figure 1 for a single group of observers the average of the 20 ordinates of these curves would be the same as the values appearing in the table. Alternate columns give recall and recognition. For instance, with a naïf group of subjects on the same side of the street as the boards the average observer made a weighted recall score of 0.287 and made 0.18 recognition per poster. There is manifest an advantage for the observers on the opposite side of the street. This is uniformly the case

in recall but only so for the naïf group in recognition. The averages in the last column are the averages of the figures in that column and not per cents obtained from figures in the bottom row. The difference in favor of the opposite side of the street is of the order of 20 to 30 per cent. The number of subjects was of course small but this trend is found in 3 of the 4 possible comparisons in the table. Moreover it would seem plausible that if the opposite side of the street gave an advantage, such as the greater visual angle, this would be more apparent with the naïf group for the others would make an effort to look at the ads and remember them in spite of the topographical handicap. This finding might have a bearing on the optimal distance from the road at which to place poster boards.

TABLE 2

| | PEOPLE | | OBJECTS | | PER CENT DIFFERENCE | |
|---|---|---|---|---|---|---|
| | Recall | Recognition | Recall | Recognition | Recall | Recognition |
| Naïf | 0.30 | 0.38 | 0.17 | 0.22 | 77 | 72 |
| Sophisticated | 1.04 | 0.59 | 0.62 | 0.52 | 61 | 13 |
| Average | 0.67 | 0.48 | 0.39 | 0.37 | 69 | 42 |

*Pictures of people vs. objects*

Most of the posters involved a picture either of a person or of some object. Very few indeed lacked a picture. It was comparatively simple to compute the recall and recognition values for all the pictures of people and compare with all the pictures of objects. The average results are summarized in table 2. Its form is quite similar to table 1. The pictures of people seem appreciably superior under these conditions. This corresponds to results found with magazine experiments.[2] The results all point consistently in this same direction. They are more marked with the naïf observers. This seems plausible,

[2] Cf. Poffenberger (op. cit.), p. 283.

for the observers actually trying to remember the advertisements would somewhat overcome the intrinsic handicap of objects vs. people.

*Naïf vs. sophisticated observers*

The above results have frequently been classified on the basis of naïvete of the observers because this seemed one of the most significant variables. It is well for a moment to consider this difference specifically. A survey of figure 1 and the tables shows the naïf results running consistently behind the sophisticated. If we derive a single figure which averages the entire recall results for all posters and all observers who were sophisticated this figure is just 38 per cent greater than the corresponding figure for the same subjects naïf. In recognition the grand average for sophisticated is 98 per cent greater than that for naïf. Obviously we must be cautious in drawing conclusions from sophisticated observers as to the magnitude of the psychological effect of advertisements on naïf prospects, although conclusions as to the comparative effectiveness of devices or principles can validly be drawn.

*Best remembered features of posters*

Advertising studies have often determined the relative memory for different aspects of the advertisement. In our case the original data were scored on the basis of several aspects of the posters. From the original tables it is possible to compute the total recall value for each of the items listed in the first six columns of the tables. If we let the value of the average for the commodity be 100 per cent and reduce the other averages to a ratio to this we have:

| | |
|---|---|
| Commodity | 100 |
| Picture | 32 |
| Slogan | 11 |
| Trade name | 86 |
| Manufacturer or dealer | 3 |
| Color | 16 |

The commodity and trade name rank highest and the manufacturer lowest (the last was not always given on the poster any-

way). The results are about what one might expect although it is perhaps a trifle surprising that more pictures were not recalled. This particular problem could not be approached readily by the recognition method.

### *Sex Differences*

Scarcely sufficient data were available to make an adequate study of sex differences. One group were women and could be paired for comparison with a male group fulfilling identical experimental conditions. Reducing all to a single average the men were 13 per cent superior in recall and the women 24 per cent superior in recognition. There is nothing sufficiently consistent to warrant drawing conclusions on this point.

### *General considerations*

It seems advisable in such studies as the foregoing to keep separate the results for recall and recognition. In some cases they corroborate one another and in other cases fail to do so. The actual correlation between the two measures, plotting every pair of scores for each poster under each condition is $0.71 \pm 0.03$.

It also seems advisable to consider separately the results for naïf subjects and those who know the nature of the experiment. Interesting differences may in this way come to light on certain problems.

The foregoing results are not to be considered as final but rather as suggestive of types of problems that merit further study with actual poster boards. The results as far as they go however, appear plausible and suggestive on a number of points.

## SUMMARY

It is desirable to study psychological aspects of poster advertising in the field as well as the laboratory because there is a greater difference between a prospect reading posters on the street and the laboratory observer than between a prospect seated at home reading a magazine and a laboratory observer. It proved to be a fairly satisfactory technique to carry observers

by a stretch of poster boards at 20 miles per hour, five minutes later giving them opportunity for spontaneous recall, then have them check the advertisements they had seen prior to the experiment and finally conduct a recognition test by reading them the names of the advertisements just observed mixed with others not included in the set of posters. They were taken by one set of boards when naïf and not knowing the nature of the experiment and then by another set when they were aware of the purpose. In scoring, one point was given each for commodity, picture, slogan, trade name, dealer, and color and half a point was deducted for familiarity. Recognition was evaluated separately.

A number of problems were studied in a preliminary way by evaluating data collected with this technique. The last board passed in a set seems to have a considerable advantage,—the usual recency effect. Primacy is a noticeable advantage with the sophisticated observers but not so much with the naïf. It appears that the latter pass a number of boards before they begin to notice them.

The posters in this case were close to the sidewalk. There is some evidence that the observers get more when riding on the side of the street opposite the boards. This effect is more marked with the naïf observers. It may be partially due to the fact that more posters fall within the visual field at a given instant.

Pictures of people are remembered better than pictures of objects in the posters. This is in accord with laboratory findings using magazine advertisements as material.

The commodities and trade names are the best remembered features. Sex differences are not apparent in the present data. The naïf observers make lower scores as would be expected. But the discrepancy between their results and those for the sophisticated observers on certain points is interesting. Probably we ought to conduct more experiments in advertising psychology with naïf observers.

The results presented are preliminary but show the possibilities and desirability of further work with such a technique.

# SEX DIFFERENCES IN 5925 HIGH SCHOOL SENIORS IN TEN PSYCHOLOGICAL TESTS

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## I. PROBLEM

Much has been written at every epoch of our educational history about sex differences and about the mental characteristics in which each sex is supposed to excel. But little experimental work has been done to determine the differences which really exist or to show in what specific respects each sex excels. Most of the studies have emphasized the variability of the sexes in total mental level. For example, Terman in his Standardization of the Binet Mental Scale found a slight but negligible superiority in favor of the girls.[1] Yerkes, Bridges, and Hardwick found no very definite or consistent difference between boys and girls in regard to mental ability.[2] Mrs. Hollingworth in her review of the experimental work on the subject showed that no significant differences in the mental endowment of the sexes exist.[3] Dr. Pyle found some difference in general mental ability which varied, however, with the chronological age of the sexes, and also with the type of test he used.[4] Dr. Snoddy in a mental survey of Utah Schools found the boys decidedly superior in certain tests and the girls

[1] L. M. Terman, "The Measurement of Intelligence," Houghton Mifflin Company, Boston, 1916, pp. 68–72.

[2] Yerkes, Bridges, and Hardwick, "A Point Scale for Measuring Mental Ability," Warwick & York, 1914, pp. 68–73.

[3] L. S. Hollingworth, "Vocational Psychology" (Appleton, 1917), Gives summary to 1916. See also Psychological Bulletin, vol. 13, pp. 377–84.

[4] W. H. Pyle, "Relation of Sex Differences to Kind of Material Used," Jour. Educ. Psychol., vol. xvi, 1925, pp. 261–264.

equally superior in other tests. The differences found by Dr. Snoddy were well beyond statistical certainty.[5] Mrs. L. W. Pressey in a study made in the Indiana Laboratory showed that the girls quite consistently made higher scores on the Intelligence Test up to about fourteen years of age, the boys completely overtaking them at fifteen and surpassing them at sixteen.[6] This result has recently been verified by Graber's study which showed that the sexes varied in mental ability during the period of development, or growth. He found that the girls in general made a superior score on the test he used up to the age of 13 when the boys tended to overtake them.[7] This was also shown in a more specific ability by Dr. Snoddy in his detailed study of mirror tracing.[8]

The differences in total intelligence level are, however, less important than any differences in special mental ability which might be found to exist. It is the purpose of the present study to make some contribution to this latter problem; to ascertain in what special mental abilities each sex excels so far as this was revealed by data obtained from 5925 high school seniors examined on ten different psychological tests.

## II. MATERIALS AND METHOD

In December 1918 Mrs. L. W. Pressey working in the Psychological Laboratory of Indiana University made a study of the differences in general and special mental ability found among 880 boys and girls in the public schools of one Indiana City.[9] To determine these differences she used a group scale of intelli-

[5] Snoddy and Hyde, "Mental Survey of Utah Schools," Bulletin University of Utah, vol. 12, 1921, pp. 1–28.

[6] L. W. Pressey, "Sex Differences Shown by 2544 School Children on a Group Scale of Intelligence, with Special Reference to Variability," Jour. Applied Psychol., vol. 2, 1918, pp. 323–340.

[7] O. C. Graber, "Sex Differences in Mental Development, as Revealed by Group Intelligence Tests," Amer. School Board Jour., December, 1925, pp. 47–48.

[8] Geo. S. Snoddy, "Learning and Stability," Jour. Applied Psychol, vol. x, 1926, pp. 1–36.

[9] L. W. Pressey, Jour. Applied Psychol., vol. 2, pp. 323–340.

gence composed of ten different tests which she gave to 441 girls and 439 boys ranging in age from nine to sixteen years or about fifty cases for each sex per age. She found that the girls belonging to the younger age groups excelled slightly in general mental ability or in the total score made on all these tests, but that the boys showed much greater variability and tended to overtake the girls at about the age of fourteen and in fact actually surpassed them at sixteen. By considering the results made by each sex on each of the ten tests in the scale some rather important sex differences were revealed indicating a difference in the special abilities measured by these tests.

During April and May of this same school year (1918–1919) one of the writers made a state-wide mental survey of the high school seniors graduating from 314 commissioned high schools of Indiana and located in every part of the state.[10] In making this survey the same set of tests was given that had been used by Mrs. Pressey,—Mental Survey Scale, No. 1, Schedule D.[11] In 1922 the results of this state-wide mental survey were published in book form by the Macmillan Co., New York. No data were given in that report relating to the scores made on the individual tests or of the sex differences which these scores revealed. These data have recently been worked up by John L. Meadows, a graduate student in Psychology at Indiana University, and are here presented.

The Intelligence Scale we used contained ten tests of twenty items each known to measure a different set of mental functions or controls: (1) a *rote memory test* for words; (2) a *logical selection test*, requiring the subject to underline in a list of words the two things the object in question is never without; (3) a test for measuring the more common *arithmetical abilities*, such as is included in most intelligence scales; (4) an *Opposites Test;* (5)

[10] W. F. Book, "Intelligence of High School Seniors," The Macmillan Company, New York, 1922, pp. 374. For description of Method see pp. 10–18.

[11] L. W. Pressey, "Sex Differences Shown on a Group Scale of Intelligence with Special Reference to Variability," Jour. Applied Psychol., vol. 2, pp. 323–340.

a test for *Logical Memory;* (6) a *Word Completion Test,* the subjects being asked to supply the missing letters in such words as b-by, b-n-na, etc.; (7) a *Moral Classification Test* in which the subjects were asked to put the figure "1" under the words in a rather long list of words "meaning something you must not do in school," the figure "2" under the words that mean being good to other people; the figure "3" under words meaning things that are bad for yourself; and the figure "4" under the words meaning to get things from others in ways you would not approve; (8) a *Dissected Sentence Test* the subjects being required to supply the missing words and phrases; (9) a *Practical Information Test;* and (10) an *Analogies Test* requiring the subject to write a word that had the same relation to the last word given in a series of three words as was expressed by a pair of words which immediately preceded it, such as girl-woman; boy-*man*; or sun-day; moon-*night.*[12]

Reliable results were obtained on each of these tests from 5925 high school seniors, 2422 boys, and 3503 girls. In the present report the record made by this group of young people on each of these tests will be individually considered in order to present all the sex differences that were revealed by the ratings made on each of these tests. By making a careful analysis of the tests in which the boys or the girls clearly excelled we hope to determine as far as this data will permit the special abilities in which the boys clearly excelled; those in which the girls excelled; and the tests or mental abilities in which the sexes scored alike.

## III. RESULTS

Since the battery of tests we used had been standardized as an Intelligence Test,[13] the general level of mental ability of

[12] For a full description of these tests containing facsimile record blanks, directions, etc., see Jour. Applied Psychol., September, 1918, pp. 250–269.

[13] The reliability of the battery of tests used for this purpose was tested in the following way: (1) Results by age from three Indiana cities showed almost identical medians for each age level; (2) two thousand cases tested with this battery of tests at the Fort Wayne

each sex and other important characteristics in regard to the variability of the sexes in mental strength were shown by the scores made on the scale taken as a whole. The individual tests were also known to measure different mental functions or controls. The scores made on each of these ten tests, therefore, shed considerable light on the type of mental functions in which each sex excels. Furthermore, all of our subjects with the exception of fourteen boys and sixteen girls were sixteen years of age or over. They were, therefore, mentally mature according to the generally accepted view of present day psychologists. By comparing our data on the separate tests with the results which Mrs. Pressey obtained from groups of boys and girls ranging from nine to sixteen years of age, we may ascertain whether the sex differences we found in our group of mentally mature boys and girls also hold for the various stages of mental development covered by Mrs. Pressey's report.

The present report will, therefore, contain data on the following points: (1) the rating made by each sex on all the tests combined; (2) the tests in which each sex excelled and the tests in which a uniform rating was made by both the boys and the girls; (3) the kind and amount of variability that were shown by each sex; and (4) the consistency of the sex differences found for different stages of mental development.

*1. General level of mental ability of the sexes compared*

Our original study showed the boys to be slightly superior to the girls at each level of the distribution. The median

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School for Feeble Minded Youth made scores which fell below the 10th percentile level for their age, while a group of brilliant children whose IQ on the Stanford Binet ranged from 125 to 162 made a score which averaged at the 99th percentile level for their age in a total distribution of the ratings for all children in three Indiana cities of 12,000 inhabitants; (3) of the 200 dull and bright children tested by the Binet, those making an IQ of 0.75 or below made a score on this series of tests which placed them at or below the 10th percentile level for their respective age groups. Those making an IQ on the Binet of 115 or over made scores on this group of tests which placed them in the highest 10th percentile group for their age.

scores made by various percentile groups are given in table 1 and show that the boys made a higher rating on the tests at all levels of the distribution.

This superiority of the boys appeared in every comparison of the sexes made in our original study and holds for the brightest students as well as for the dullest members of our total group.[14] This fact is clearly shown by the curves in figure 1 taken from the report of the original study, page 272.

The best measure, however, of the *amount* of difference found between the sexes is the fact that 56.2 per cent of the boys made a score above the median for the girls while only 41.4 per cent of the girls made a score above the median for the boys. It should also be remembered that this superiority of the boys over the girls holds for all levels of the distribution as may be seen

TABLE 1

| SCORE MADE BY | PERCENTILE GROUPS | | | | | | | | | | | | | CASES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 5 | 10 | 20 | 25 | 40 | 50 | 60 | 75 | 80 | 90 | 95 | 99 | |
| Boys | 90 | 102 | 112 | 122 | 126 | 134 | 139 | 143 | 150 | 153 | 160 | 165 | 176 | 2,477 |
| Girls | 83 | 101 | 110 | 120 | 123 | 131 | 136 | 141 | 147 | 150 | 157 | 163 | 175 | 3,711 |

by comparing the curves in figure 1. A mere glance at this figure will show that a larger percentage of the boys made the higher ratings of A and B on the tests while a smaller percentage of the boys made the lower ratings of D and E on the tests.

These results are in sharp contrast to those obtained by Mrs. Pressey for children nine to sixteen years of age who took the same series of tests only a few months before our high school seniors. Her girls had a slightly higher median score for every age level up to fifteen. At sixteen the boys in her groups overtook and surpassed the girls.

As already pointed out above, the case is just the reverse for our group of more mature high school seniors. Here the boys

[14] Compare W. F. Book, "Intelligence of High School Seniors," The Macmillan Company, 1922, especially pp. 269–272.

excelled the girls on the test taken as a whole at every level of the distribution.

Three possible interpretations were advanced by Mrs. Pressey for the superiority of her girls and the fact that the boys tended to overtake them at fifteen. (1) One explanation was that the girls were superior to the boys in general intelligence. She argued that the boys at fifteen and sixteen whom she tested might be a more highly selected group because more dull girls than boys may have remained in school up to this age. (2) A second explanation proposed was that since the boys varied

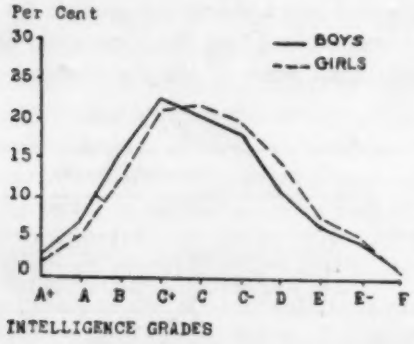


FIG. 1. FREQUENCY CURVES SHOWING PERCENTAGE OF BOYS AND GIRLS MAKING EACH GRADE OF INTELLIGENCE FOUND AMONG HIGH SCHOOL SENIORS

more on the intelligence tests than the girls the girls might be expected to average higher than the boys as a sort of biological compensation for the advantages possessed by the boys. It will be remembered that more extremely bright boys than girls and more extremely dull boys than girls were found in each of her age groups. But no data or facts were obtained in support of such an hypothesis except the fact that the boys varied more than the girls at every age level represented by her data. (3) A third explanation offered for the fact that the boys at the sixteenth year level tended to surpass the superior record made by the girls was the well-known fact that the girls are accelerated

from one to two years in their mental and physical development. But Mrs. Pressey had no data which enabled her to decide which one of these possible explanations was correct.

That the latter explanation is the correct one is shown by the facts revealed by our study of the ratings made by 5925 mature high school seniors. Here the boys clearly excelled the record made by the girls on the ten tests taken as a whole and as we shall presently see on seven out of the ten tests when considered separately. But Mrs. Pressey's girls had surpassed the record made by her boys on these same ten tests at every age level up to fifteen actually surpassing them on the record made on eight out of the ten tests during this developmental stage. The fact that her group of boys had overtaken the girls at the sixteenth year level and that the boys in her mature group made a better rating at every level of the distribution would seem to prove that the superiority of Mrs. Pressey's group of 441 girls within this developmental period was due to their more rapid mental and physical development. This would clearly make the tests easier for these accelerated girls.

The superiority of our high school senior boys shown by the results presented above can be best accounted for by the fact that this group of senior boys was a more highly selected group than the girls. More of the duller girls may have remained in high school to graduate while more of the duller boys were tempted or compelled to drop out to go to work. This seems to be a plausible explanation of the superior record made by our boys because there were many more girls than boys in the senior classes we tested. There was also much evidence in our original data to show that the high schools of the state are better adapted to the interests and intellectual needs of the girls. This superiority of our boys cannot be interpreted as evidence or proof of the general superiority of the boys in general mental ability. Neither can the superiority of the girls who were in the developmental stage in Mrs. Pressey's unselected group be taken as evidence of the superiority of the girls in general intelligence. The latter was clearly due to their more rapid mental development which made the tests easier for them.

Neither does the marked superiority of the high school senior boys shown by our results mean that this superiority was due to their high score on certain tests in which they clearly excelled. This possibility is excluded because they made a consistently higher rating than the girls on seven out of the ten tests used, as we shall presently show. We conclude that the superiority of Mrs. Pressey's girls during the developmental stage was due to the fact that they were accelerated in their mental development, while the consistent superiority of our high school senior boys was due to the fact that we tested a selected group of mature boys, more of the duller girls having remained in high school to graduate. That this explanation is correct is indicated by the fact that there were roughly a third more girls than boys in the senior classes we tested and by the further fact that much evidence was collected in our original study to prove that the high schools were better adapted to the interests and needs of the girls.[15] There is no evidence in the data collected in either of the studies in question to show that either sex is superior to the other in general mental ability. Moreover this is not after all the important point about sex differences. It is rather the qualitative differences in special abilities that may be revealed by the scores made by the members of each sex on tests known to measure the functioning of different mental abilities in which the sexes may differ fundamentally. We, therefore, turn to the problem of the scores made by the sexes on each of the ten tests used in our experiment.

### *2. Tests in which each sex clearly excelled*

Although the boys in our study excelled the girls in all but three out of the ten tests it is significant to point out that the scores made by them on Tests III and IX were very superior to those made by the girls. These tests called for the exercise of all common arithmetical abilities and for information on all sorts of things with which each sex had had much experience.

[15] Compare on this point W. F. Book, "Intelligence of High School Seniors," The Macmillan Company, New York, 1922, pp. 289–292.

This superiority was shown by the distribution tables worked out for the scores made on each test by our total group and by the median and percentile scores made by the boys and the girls on each of the ten tests in the series. These data showed that the boys clearly excelled the girls on Tests III and IX at

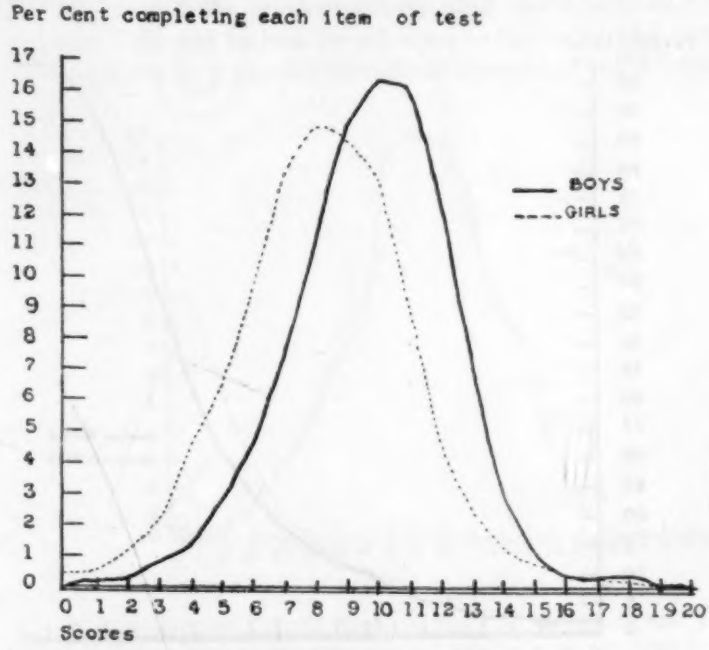


FIG. 2. DISTRIBUTION CURVES SHOWING THE PERCENTAGE OF THE BOYS AND GIRLS WHO COMPLETED FROM 0 TO 20 ITEMS ON TEST III

every age level from 9 to 23 and that they made a slightly higher score on all the tests except V, Logical Memory; VI, Word Completion; and VIII, Dissected Sentences, on which the girls made a higher rating than the boys at every age level from 9 to 23.

The marked superiority of the boys in Test III is pictured in figure 2 which shows the percentage of boys and girls who com-

pleted each item in the test. The curves for Test IX show sex differences which are practically identical to those indicated by the curves in figure 2 though not quite so great in amount. Figure 3 gives the percentile curves for Test IX and shows that the boys made a higher rating on this test at every level of the distribution. These data show that the boys are consistent in

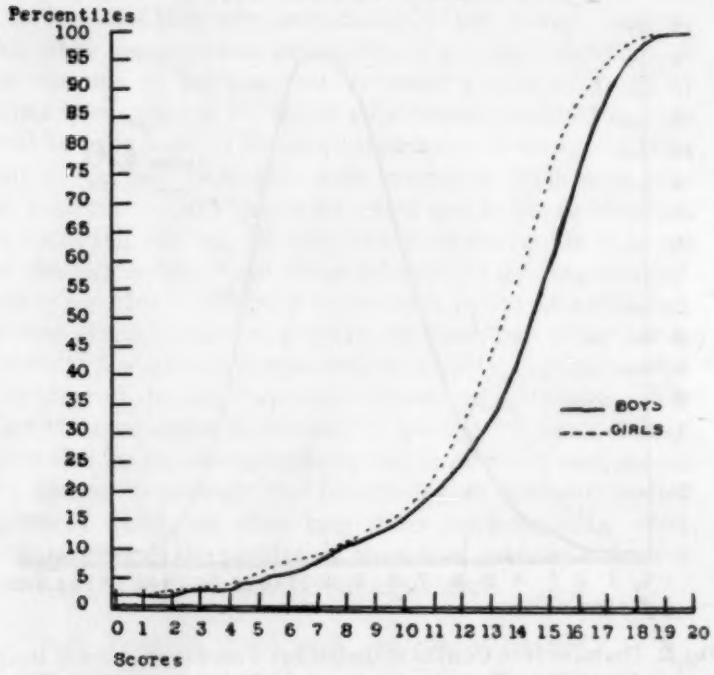


FIG. 3. PERCENTILE CURVES SHOWING THE SCORE MADE BY VARIOUS PERCENTILE GROUPS OF BOYS AND GIRLS ON TEST IX

making a higher rating on these two tests at every level of the distribution.

Similar curves drawn for the data obtained in Tests I, Rote Memory; II, Logical Selection; IV, Opposites; VII, Moral Classification; and X, Analogies, showed that the boys were also slightly superior to the girls on these tests. But no real

sex differences were shown on any of these tests, as the distribution and percentile curves for Test I in figures 4 and 5 conclusively show. The curves in these figures are slightly higher for the boys than the curves for the girls, but not enough to show any real sex differences; because the difference is so slight; and because the girls surpassed the boys on these same five tests during the developmental period extending from 9 to 16 years. As may be seen by reference to figures 4 and 5 these curves are not only parallel throughout their entire course; they

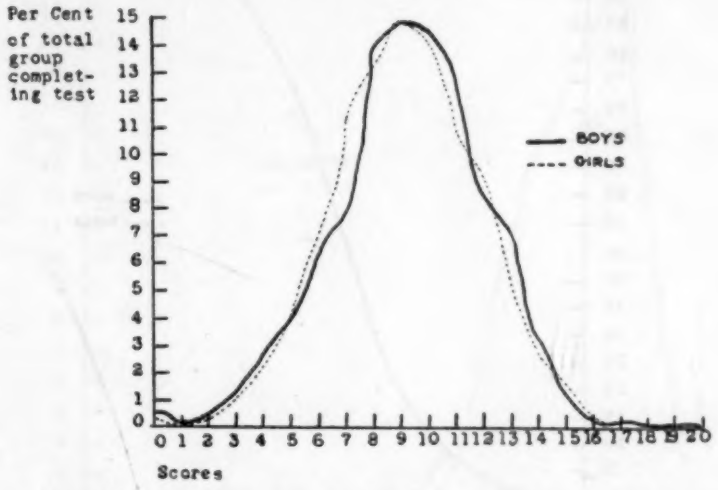


FIG. 4. DISTRIBUTION CURVES SHOWING THE PERCENTAGE OF THE BOYS AND GIRLS WHO COMPLETED FROM 0 TO 20 ITEMS ON TEST I

almost coincide. It is, therefore, clear that little sex difference exists in the possession of the functions measured by these tests. The brightest girls make about the same score as the brightest boys; the dullest girls make scores which are only slightly below those made by the dullest boys and so for every level of the distribution. Since the curves for the other four tests listed above were practically identical to those given for Test I in figures 4 and 5 and since only very negligible sex differences were found by Mrs. Pressey in these same five tests

we conclude that no significant sex differences exist in the functions or special abilities measured by these five tests.

Mrs. Pressey's results, however, showed that her girls made a decidedly higher rating on Tests V, Logical Memory, Test VI, Word Completion, and Test VIII, Dissected Sentences. These

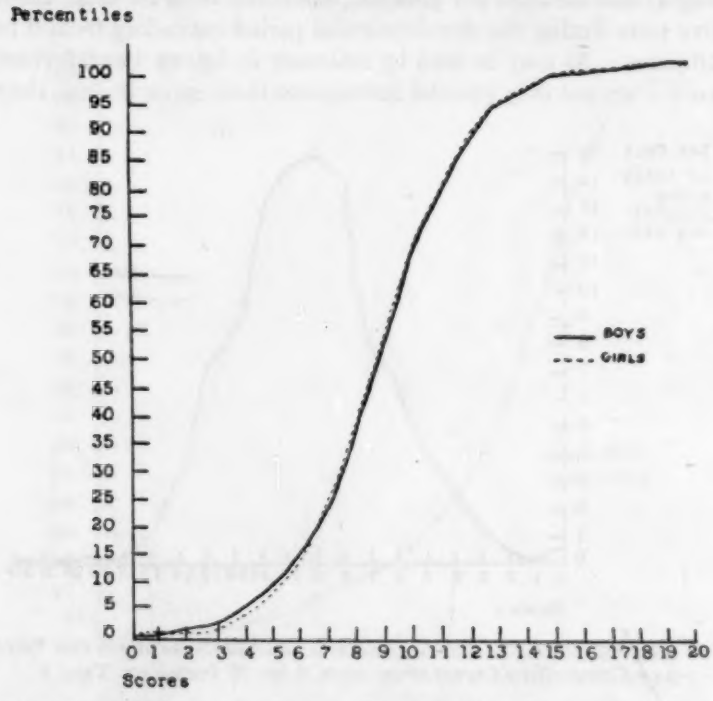


FIG. 5. PERCENTILE CURVES SHOWING THE SCORE MADE BY VARIOUS PERCENTILE GROUPS OF BOYS AND GIRLS ON TEST I

Solid line is the boys', dotted line the girls' record

were the same tests on which our mentally more mature girls still rated higher than the boys, showing that the girls at every age level from 9 to 23 excelled the record made by the boys on each of these three tests at every level in the distribution of scores. The distribution and percentile curves for Test VI is

typical of the curves and data for the other two tests in which the girls consistently excelled (compare figures 6 and 7). They, therefore, show that the girls belonging to every age group are consistent in making a higher score on these three tests than the

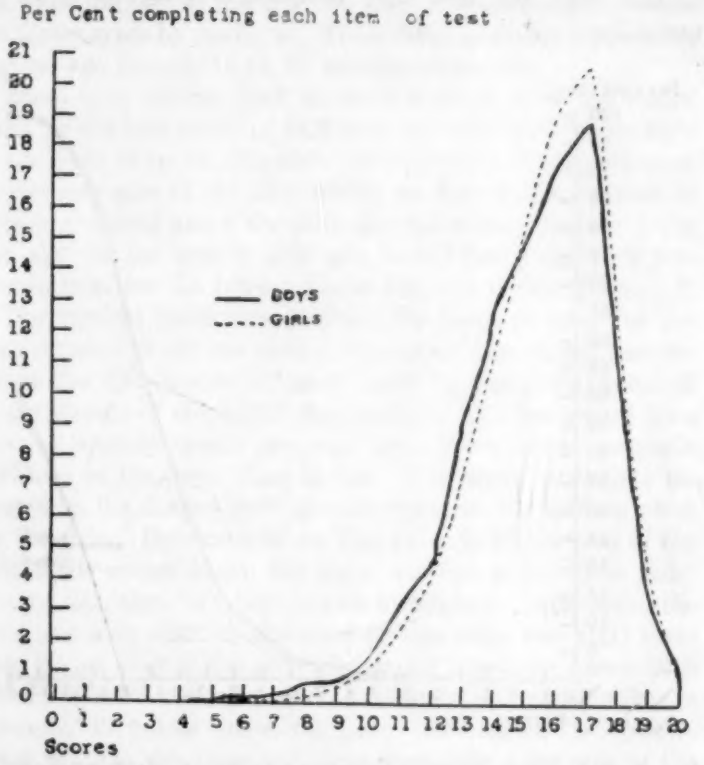


FIG. 6. DISTRIBUTION CURVE SHOWING THE PERCENTAGE OF BOYS AND GIRLS WHO COMPLETED FROM 0 TO 20 ITEMS IN TEST VI

score made by the boys. But it is, perhaps, significant that they do not excel the boys as much in these three tests as the boys excel the girls at every age level on Tests III and IX.

*3. Differences in the variability of the sexes*

These sex differences in individual tests are shown in another way by the data contained in chart 1 which shows not only how the scores made by the sexes compare on each of the ten tests in median score but how they compare in range of score or variability.

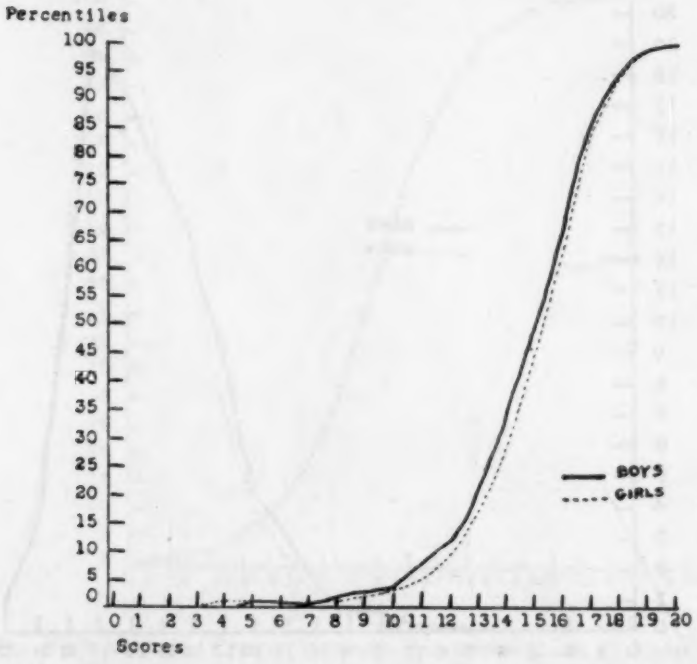


FIG. 7. PERCENTILE CURVES SHOWING THE SCORE MADE BY VARIOUS PERCENTILE GROUPS OF BOYS AND GIRLS ON TEST VI

In her study of the ratings made on this same series of tests by 880 boys and girls ranging in age from 9 to 16 years Mrs. Pressey found that the boys showed a greater tendency to variability than the girls on all the tests combined and on each test taken separately. This variability was also found to be greater for some of the tests than for others.

For our group of more mature individuals we found that the boys excelled the girls and that they varied more than the girls in every test except III. In Tests V, VI, and VIII the tests in which the girls excelled practically no sex difference in variability was found. In Test III where the boys excelled the girls the most the ratings made by our mature girls varied more than the scores made by the boys. These differences also held for our various age groups, 16 to 23, treated separately.

These facts are recorded on chart 1 which gives the record made by our own group of 2422 boys and 3503 girls who ranged in age from 16 to 23. To show the variations in range of score at the extremes of the distribution we figured the per cent of girls who scored above the 90th percentile score for the boys, and also the per cent of girls who scored below the 10th percentile level for the boys. These data are shown in chart 1.

The vertical black bars indicate the range in score for the boys on each of the ten tests in our series; the shaded bars indicate the distribution of scores made by the girls, expressed in percentage of the boys' distribution. The horizontal lines running entirely across the page mark the various percentile divisions in the boys' distribution. The short cross-lines intersecting the shaded vertical bars represent the median score for the girls. For example, on Test III only 29 per cent of the girls made scores above the boys' median score. The girls' median has, therefore, been drawn at the boys' 29th percentile level (see *a* on chart 1) and since on this same test (III) there were 29 per cent of the girls who scored below the boys' 10th percentile level the lower end of the girls' distribution bar is extended 19 points below the boys' distribution line (see *b*, chart 1). On this same test there were only 5 per cent of the girls who scored above the boys' 90th percentile level. The upper end of the girls' distribution bar for this test has, therefore, been extended only to the boys' 95th percentile (see *c* chart 1). Similar relationships between the distribution of the scores made by each of the sexes on each of the ten tests are roughly pictured in chart 1.

By a careful study of this data it will be seen that the boys'

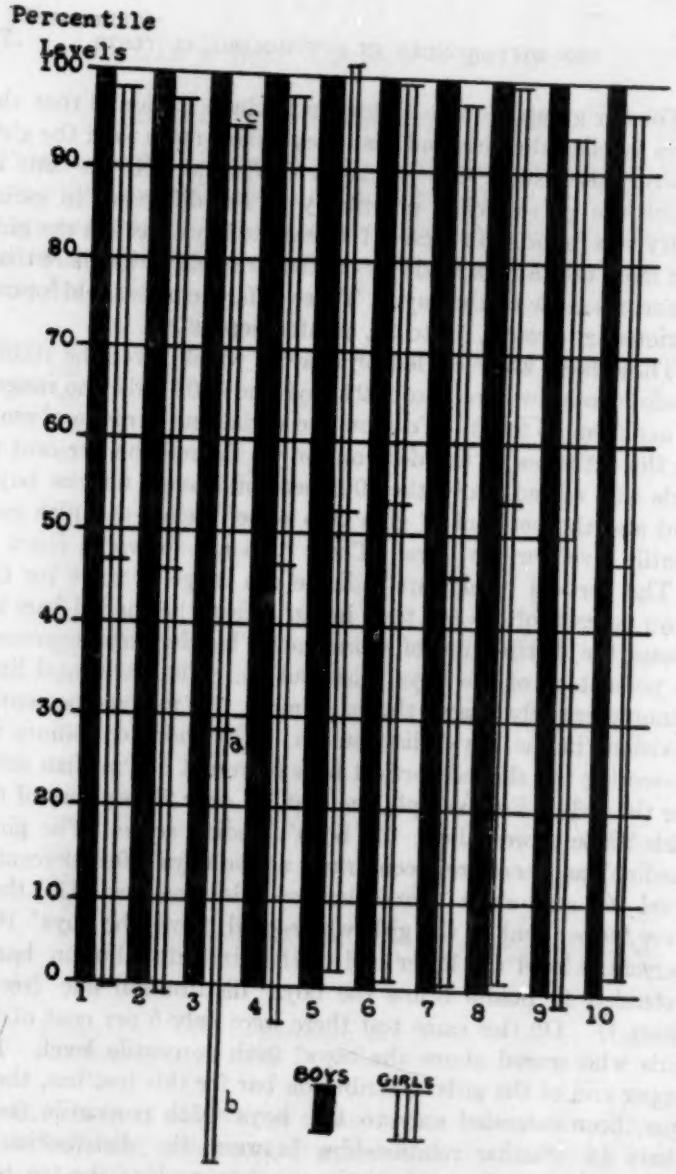


CHART 1. SHOWS HOW THE SEXES COMPARE IN EACH OF THE TEN TESTS IN BOTH RANGE AND MEDIAN SCORE

The solid bars represent the record made by the senior boys; the shaded bars the record made by the senior girls.

median scores are better than the girls' median scores on all the tests except V, VI, and VIII. It will also be seen that the boys' scores show a greater range than the girls' on all the tests except Test III where the scores made by the girls vary more than those made by the boys. It will also be seen that the variability of the sexes is practically the same for the tests in which the girls excelled; namely, V, VI, and VIII; that very little difference in variability is found in Tests I and II; and that the girls vary much less than the boys in all the other tests.

These results confirm for our more mature group of 5925 individuals the results obtained by Mrs. Pressey for 880 individuals ranging from 9 to 16 years of age; namely, that greater variability exists among the boys. Furthermore, our results prove that this variability is not due to irregularity in mental development since all the boys in our group were mentally mature. Our results further show that the superiority of the boys on the scale of tests as a whole was partly due to their superior scores on the two tests where the variations in scores was greatest; namely, Tests III and IX. The girls on the other hand made the best median scores on the tests which showed the least variability in range of score. In other words there was the least variability on the tests in which the girls excelled and the most variability on the tests in which the boys excelled.

The nature of a test, therefore, affects both the score obtained by each sex and the range in scores made on the test. And since the boys ranging from 9 to 16 years of age were found to vary consistently more than the girls during this developmental stage and since they still vary more than the girls when greater mental maturity is reached, we conclude: (1) That boys show a greater tendency to vary in mental capacity than do the girls. Age for age up to maturity and beyond we find more extremely bright boys than girls and also more extremely dull boys than girls.[16] Furthermore the further in these extremes we go the greater is the percentage of boys; (2) a second fact which stands out very clearly is that this variability is due in part to the

[16] Compare W. F. Book, "Intelligence of High School Seniors," The Macmillan Company, New York City, 1922, especially pp. 272–273.

nature of the test. In one test the girls varied more than the boys. In the other nine tests the boys varied more than the girls. Greater variation was also found in some of the tests than in others.

*4. Consistency of these sex differences for ages nine to twenty-three*

The last important problem on which data was secured in this study was the consistency of these sex differences for different stages of development. From the facts already presented it is clear that the boys in our more mature group of high school seniors excelled the girls at every age level from 16 to 23, on Tests III and IX; that the girls belonging to the same age groups excelled the boys to a less extent on Tests V, VI, and

TABLE 2

*Average per cent of boys belonging to different age groups who scored above the median score for the girls*

| AGES COMPARED | INDIVIDUAL TESTS | | | | | | | | | | CASES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | IX | X | |
| 9–15 | 44 | 48 | 61 | 43 | 46 | 40 | 38 | 40 | 50 | 43 | 888 |
| 16–23 | 53 | 54 | 71 | 53 | 47 | 45 | 53 | 45 | 65 | 52 | 5,925 |

VIII; and that the ratings made on the other five tests showed a negligible amount of sex difference for these age groups.

Leaving out of consideration for the present the differences in special mental abilities which these results most probably indicate the question naturally arises whether these results represent a real sex difference or only a difference in training, sex experience and the like. Important light will be thrown on this problem if we compare the data obtained from our more mentally mature group of boys and girls ranging in age from 16 to 23, with the results obtained on the same tests by Mrs. Pressey who tested only a few months before a group of more immature boys and girls ranging from 9 to 16 years of age. Do the same sex differences we found among our more mentally mature high school seniors occur at the various levels of development represented in Mrs. Pressey's results?

To make these comparisons valid we determined the per cent of the boys belonging to each age group who scored above the median score for the girls on each of the ten tests. In Table 2 the averages for the years 9 to 15 are compared with the records made by our more mature group of boys and girls. As may be seen from this data the boys in both these groups are consist-

TABLE 3

*Per cent of boys belonging to different age groups who scored above the median score for the girls*

| AGES COMPARED | INDIVIDUAL TESTS | | | | | | | | | | CASES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | IX | X | |
| 9 | 35 | 49 | 70 | 49 | 50 | 33 | 37 | 49 | 36* | 33 | 90 |
| 10 | 51 | 45 | 60 | 32 | 44 | 29 | 24 | 32 | 36* | 42 | 92 |
| 11 | 43 | 49 | 55 | 50 | 51 | 50 | 50 | 32 | 45 | 40 | 121 |
| 12 | 45 | 48 | 68 | 53 | 62 | 40 | 37 | 35 | 65 | 55 | 127 |
| 13 | 46 | 56 | 61 | 41 | 44 | 41 | 39 | 47 | 52 | 50 | 122 |
| 14 | 47 | 32 | 63 | 34 | 43 | 43 | 29 | 46 | 60 | 37 | 133 |
| 15 | 38 | 55 | 52 | 45 | 36 | 43 | 52 | 41 | 53 | 42 | 107 |
| 16 | 52 | 50 | 74 | 45 | 47 | 54 | 62 | 52 | 63 | 59 | 88 |
| Average | 45 | 48 | 63 | 44 | 48 | 42 | 41 | 42 | 51 | 45 | |
| 16–23 | 53 | 54 | 71 | 53 | 47 | 45 | 53 | 45 | 65 | 52 | 5,925 |

* It is important to note that even boys are deficient in practical information before twelve years of age. At least they are deficient in the type of information called for by this test. The girls being one or two years ahead of the boys in their mental and physical development would have an opportunity to establish these associations and so be able to make the responses called for in the test better than the boys up to twelve years of age as the table shows.

ently superior in Test III, a test for measuring the common arithmetical abilities, and Test IX, a standard information test. The girls are superior in Tests V, Logical Memory, VI, Word Completion, and VIII, a Dissected Sentence test. But in the group ranging from 9 to 15 years of age, the girls are slightly superior in *all* the tests save III and IX. At fifteen and sixteen the boys attain to the level made by the girls in all the tests

save V, VI, and VIII, greatly excelling them in Tests III and IX. At sixteen and beyond the boys make a higher rating on *all* the tests except V, VI, and VIII. These facts are shown by the data contained in table 3 which gives the average percent of the boys belonging to different age groups who scored above the median for the girls on each of the tests in the series.

From an inspection of table 3 it will be seen that the same sex differences appear if we examine the record made by the different age groups represented in Mrs. Pressey's results which were found for high school seniors ranging in age from 16 to 23 years. We conclude that the sex differences already described are consistent for the different stages of development and that all the special abilities in which each sex excels should be qualitatively and quantitatively determined because of their special importance for vocational and educational problems of every sort.

This type of investigation of sex differences has been under way in the Indiana Laboratory for the past two years and important results of these qualitative differences will soon be published by Professor G. S. Snoddy and his graduate students who have been working on this phase of the subject.

## IV. INTERPRETATION AND DISCUSSION OF RESULTS

### *1. General summary of results*

The results obtained in this study may be briefly summarized as follows:

1. The boys at every age from 16 to 23 have made a higher total score on the tests combined than did the girls. From 9 to 15 this condition is reversed. During this developmental period the girls are consistent in making a higher median score than the boys.

2. This superiority of the boys in our high school senior group was due to the fact that they excelled the girls in median score on seven of the ten tests. In Mrs. Pressey's immature group ranging in age from 9 to 15 the girls excelled the boys in eight out of the ten tests.

3. The boys excelled the girls in Tests III and IX at every age level from 9 to 23. The girls excelled the boys in Tests V, VI, and VIII at every age level represented in both Mrs. Pressey's and the writers' results.

4. The boys show a greater tendency to variability both in total score and in the record made on each of the ten tests used in the experiment. Before sixteen their scores varied more than the ratings made by the girls on every test in the series. After sixteen the girls varied more on Test III than did the boys.

5. This variability is, therefore, clearly influenced by the nature of the test. The boys varied more on some of the tests than on others. And among our mature group of high school seniors the girls varied more on Test III than did the boys.

6. The boys belonging to every age group consistently excelled the girls' record on the tests calling for arithmetical ability and practical information. The girls on the other hand just as consistently surpassed the boys' record at every age level from 9 to 23 on the word completion, the dissected sentence and the logical memory tests.

7. On the rote memory, logical selection, opposites, moral classification, analogies and logical memory tests the boys overtake the girls as mental maturity is reached, our group of 2422 senior boys actually surpassing the median score made by the 3503 senior girls on these tests.

These results point to certain rather definite conclusions in regard to a number of problems raised about sex differences in previous investigations. These should be briefly discussed.

In the first place the sex differences in total score found in this and in Mrs. Pressey's previous investigation can not be due to the nature of the tests used as has sometimes been suggested. For before 16 the girls are consistent in making a higher rating on this same battery of tests. After sixteen our group of boys were consistent in making a higher rating on the same series of tests. The former superior rating of the girls is clearly due to the fact that the girls' development is accelerated from one to two years during this period. Hence any standardized in-

telligence or educational test should be easier for them. The superior rating made by our high school senior boys is doubtless due to the factor of selection. More dull girls probably remain in high school to graduate, leaving a somewhat superior group of boys for the senior class. This is suggested by the fact that there were more girls than boys in the senior classes we tested and by other data obtained in our original study which showed that the high schools of the state were better adapted to the interests and intellectual needs of the girls.[17]

A part of the superior rating made by the boys on the tests taken as a whole was, of course, due to the superior rating they made on Tests III and IX. This had a tendency to raise their median score for the series of tests taken as a whole. But the fact that the boys actually caught up and surpassed the girls on five other tests in which the girls had made a consistently higher rating at all age levels preceding sixteen would argue against this hypothesis as an explanation for the superior ratings made by the high school boys. We could scarcely say that the tests in rote memory, logical selection, logical memory, opposites and for detecting analogies favored the boys, as the word-completion and dissected-sentence tests clearly favored the girls at every age level represented in both Mrs. Pressey's and our own experiment. In fact the boys did not do well on these tests until mental maturity was reached at sixteen. And since the girls did better in eight out of ten tests before the age of sixteen and did better in only three out of ten tests after sixteen, while the situation for the boys is just reversed, it can not be concluded that the sex differences shown in total score is due to the nature of the tests we used. Neither can it be said that the tests we used were easier for the boys taken as a group. They were easier for *our* group of *senior* boys for another reason as the same group of tests were easier for girls under sixteen for still a different reason.

It may also be concluded that the greater variability of the boys is not a matter of development as Mrs. Pressey suggested

[17] Compare on this point W. F. Book, "Intelligence of High School Seniors," The Macmillan Company, New York, especially pp. 289–292.

because the tendency for the boys to vary more than the girls continued among the members of our more mentally mature group. Our genetic study of this problem of variability among the sexes proves that for the type of performance demanded by our tests the boys actually vary more than the girls at every age level from 9 to 23.

It should, however, be pointed out that variability is directly influenced by the nature of the test or the tasks set by a test. For all the groups of boys ranging in age from 9 to 23 varied more on some tests than on others. This was true whether we considered the group as a whole or considered the various age groups separately or made some other classifications of the members belonging to our total group. The boys varied more in total score on some of the tests than on others. Moreover our group of 3503 more mature senior girls varied more on Test III than did the boys.

Nor can the greater variability of the boys be used to explain the fact that the girls so often make higher scores on intelligence and educational tests. The superior scores of the girls on our intelligence tests before sixteen were clearly due to the fact of their more rapid mental development (not that they were actually brighter than the boys) to make up in part for the greater variability of the boys. This Emersonian idea of compensation has very foolishly been offered as a possible explanation for the higher scores quite commonly made by girls on all educational and intelligence tests. It has little or no basis in fact.

*2. Importance of the sex differences revealed by this study*

The important thing after all is not sex differences in general mental endowment or mental strength but differences in the special abilities which each sex may possess in an uneven degree. Differences of this type are by no means such a negligible factor as they are generally supposed to be. That important sex differences both in variability and in specific mental functions exist is clearly shown by the data presented in this report. Both facts are proved by the genetic treatment given our data

and by the fact that enough cases have been used to make the results representative. Our high school seniors were, of course, a selected group. Since these differences appear in about the same proportion in both the selected and in the unselected group they seem fairly well established. It remains to be determined in what specific respects the sexes differ and the amount of difference that really exists in each special ability in which each sex excels.

To this latter problem our study has made a contribution. It is important to know that boys vary more than the girls in every individual test that we used and at each stage of mental development as well as in a mature and selected group.

Our results also showed that the boys, at every stage of development covered by the ages 9 to 23 clearly excelled in the test which measured the common arithmetical abilities and in the test for practical information; that the girls excelled in the tests which appealed to logical memory and called for the exercise of certain language abilities. The girls at every age level were, therefore, superior to the boys in primary memory, in their control of associations, in readiness to handle language forms. The boys surpassed the girls at every age level in the tests calling for practical information and the exercise of arithmetical abilities of every sort.

These are important differences which would determine spontaneous attention and interest in school and throughout life determining one's success in certain academic and vocational pursuits. It would, therefore, seem highly worth while to determine by accurate analysis and by objective measurement all the mental capacities in which each sex excels, the amount of these differences in special abilities that actually exists and also how deeply these differences are ingrained in the native constitution of either sex. This type of investigation would seem far more practical and sensible to the writers of this report than to spend so much labor and time in trying to determine whether one sex is brighter or generally superior to the other. In fact, mental alertness and brightness may be far more a matter of special capacities or special mental abilities than most

psychologists believe. And since we found important sex differences as we passed from test to test in our series and also a marked sex difference in variability we conclude that special habits or special abilities instead of some general ability or power is responsible for these reaction results. Our results, therefore, clearly indicate the direction which future studies of sex differences should take. The most profitable approach to their study would be to stress the qualitative method to which attention has already been called. For these qualitative differences can be accurately determined and objectively measured by means of psychological tests.

# THE RANGE OF APPREHENSION AS AFFECTED BY INTER-LETTER HAIR-SPACING AND BY THE CHARACTERISTICS OF INDIVIDUAL LETTERS

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## AIMS

The investigation reported by this paper was suggested by certain results in an experiment several years ago upon "Proof-readers' Illusions" (28) and a thorough review of the literature appertaining to the many aspects of the problem of the legibility of printing type. In our own former investigation and in other experiments it has been observed, among other things, that individuals vary widely in proofreading efficiency,—that certain letters of the alphabet act as "determiners" to attention lending themselves both to the speed and the accuracy of reading,—and that the legibility of individual letters is in part dependent upon their characteristic shapes. These observations, with the further suggestion that inter-letter spacing may affect legibility, led us to arrange an experiment whose purpose was to determine: (1) whether or not the range of perceptual apprehension is affected by (*a*) a one-half-point copper space between all letters in nonsense arrangement, and (*b*) the shapes of the various letters themselves when the spacing factor is held constant; and (2) what correlation, if any, obtains between the range for non-specialized groups of letters and proofreading efficiency.

## APPARATUS

The instrument of exposure selected for the carrying through of the plans was a vertical model of the Dodge mirror-tachistoscope (11), the interior view of which is shown in figure 1 and

the exterior view of which is shown in figure 2. This apparatus possesses two modifications over the horizontal model of Professor Dodge (11): it is such that it sits upright, the subject having his eyes adjusted at a special hood at the eye-piece at the

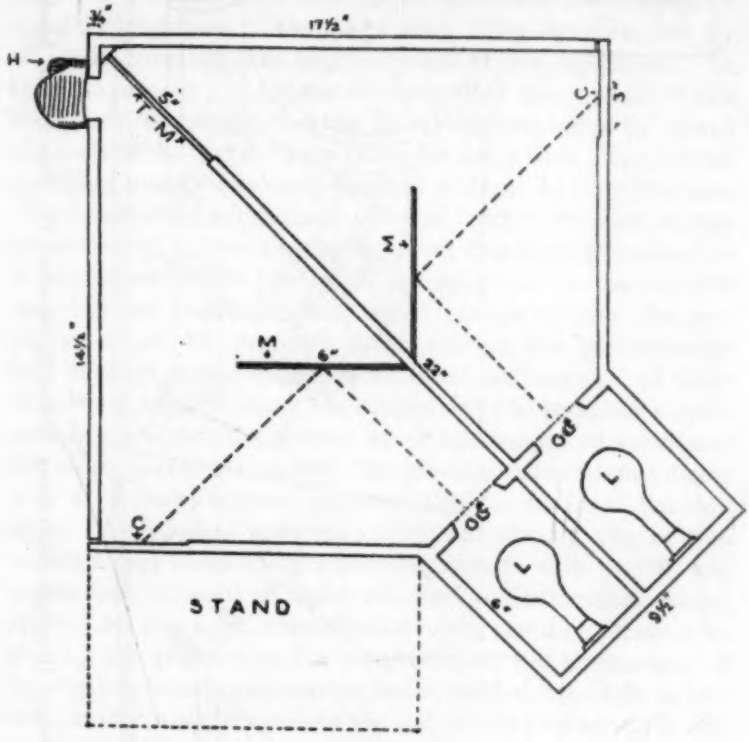


FIG. 1.

*C*, card; *M*, mirror; *GG*, ground glass; *H*, hood; *L*, light; *TM*, trans parent mirror.

Scale: 1 inch = 4 inches.

top, with the cards inserted in slots carrying their printed matter at right angles to the long dimension of the box but still in an horizontal plane; and it has a platinized reflecting and transmitting mirror, with a ratio of transmission to reflec-

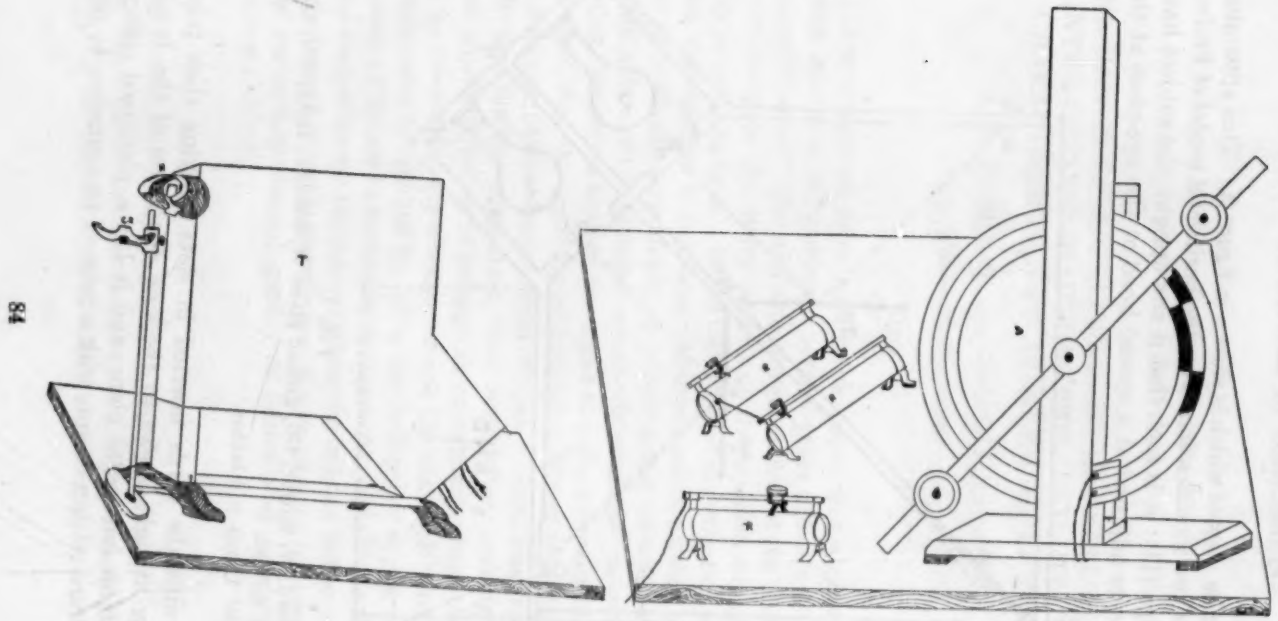


FIG. 2.

*T*, tachistocope; *D*, rotary disc timing device; *R*, rheostat; *Cr*, chin rest; *H*, hood

tion of 30:36, instead of photographer's[1] dark glass or ordinary plate glass which had been suggested by Professor Dodge. The entire source of electricity for lights was by rheostats controlled to a constant voltage of 110. Another rheostat was placed in circuit with the reflected light so that the reflected field was kept equal in brightness to the direct field. The exposure-time for all cards presented was kept constant at 150 sigmas (for the current, possibly not for the nitrogen-filled lamps of 50 Watts because of the unequal inertias in any electric lamp) by means of Crosland's (31) gravity-propelled timing device. The general supply of energy was daily checked with an A. C. volt-meter. The time-control as originally designed carried two short copper strips riveted to the rotating wheel so that each part-rotation of the wheel caused two metal spring-brushes to be engaged thus lighting successively for equal periods of time the pre-exposure and the exposure fields, leaving the post-exposure field entirely dark. To allow an equal brilliancy of all three fields we continued one of the copper strips to complete a circle around the wheel, the shorter sector making the exposure and the longer sector giving both the pre- and post-exposure lights with an equally brilliant exposure field interspersed between them. At frequent intervals, daily and oftener, the time of exposure was checked by obtaining records with a 100 d.v. tuning-fork on smoked paper attached to the shorter sector; alterations, if needed, were effected in the speed of rotation by shifting the position of the weights upon the lever-arms. A wooden peg or stop was constructed to catch and hold the lighter arm, so that a slight touch to the end of this stop served to displace it sufficiently to release the weighted arm and the wheel then rotated. The experiment was conducted in a room made entirely dark by closed shutters except for a shaded, dim light placed over the recording pad at the observer's right hand.

Seven different series of cards, each card 88 mm. square, were

[1] We are greatly indebted to Professor Madison Bentley for recommending this platinized transparent mirror, for, until it was obtained, we had great difficulty in making the two images, the reflected and the transmitted, coincide because of the refraction of thick plate glass.

constructed and printed in lower-case 10-point body Caslon type, set solid one letter with another. The seven were then duplicated, except with a one-half point copper space introduced between each of every two letters, making in all fourteen sets of cards. The solid or unspaced cards we have labeled A cards and the spaced ones, B cards. In each of sets A and B, the various series contained characters as follows: Series I, the letters of the entire alphabet; Series II, the unseraphed letters, r, a, x, e, s, w, n, o, u, c, v, m, and z; Series III, the oblique or diagonal characters, z, v, x, w, y, and k; Series IV, the curved letters, g, e, o, s, a, and c; Series V, the seraphed characters, l, h, y, i, f, b, j, p, t, q, d, k, and g; Series VI, the curved-vertical letters, q, b, d, and p; and Series VII, the vertical characters, i, n, m, u, r, l, t, h, j, and f.[2] In the total of the seven series each letter of the alphabet was represented exactly fifty-six times, distributed as follows: Series I, 10 times; Series II and V, combined, 20 times; and Series III, IV, VI, and VII, combined, 26 times. This plan was adopted so that each letter would have equal chances with every other letter, to prevent perseverative or preferential reproductions which sometimes have occurred, and so that statistical treatment later of each character would be all the more convincing.

The letters for any given series were assorted by the usual "hat" or chance method in an entirely random and chance order; the procedure consisted in shaking in a container slips of paper bearing the letters and the drawing of these out one by one. The number of letters used ranged from 3 through 10, and there were five samples (cards) of each number, such as five 3's, five 4's, and so on through the 10's, making a total of 40 cards to each series. The individual cards of each series were shuffled into a chance order for the first subject, and each chance order (seven in seven series) was repeated on the remaining 29 subjects in both experiments A and B. The order of the series was the same for all subjects and for A and B. The latter fact,

[2] The separation of the characters into the four characteristic shapes of oblique, curved, curved-vertical, and vertical was suggested by Messmer, see Crosland's monograph (28, p. 149).

as well as the similarity of the intra-series orders for A and B, is worth remembering throughout the remainder of the paper.

Wherever in the remainder of this paper we shall use A or B, we shall refer to the unspaced and spaced cards, respectively; the Roman numerals, when applied to series, will refer to the various groupings of letters which we have described on a previous page; and the employment of X and Y will denote two groups of subjects, divided on the basis of our technique.

## SUBJECTS AND TECHNIQUE

An unselected group of thirty subjects was secured from among the University of Oregon students and faculty. These were divided at random into two numerically equal groups, X and Y, and were started on the A and B cards, respectively; both sets of cards were identical except for the inter-letter hair-spacing of B; both were exposed in the same fashion; both sets contained cards in identical orders one with the other; and both sets of series had the same order. After completing its own set of cards, each group of subjects switched over to the set of the other group of subjects, X–B and Y–A. Thus, group X subjects were submitted to all seven series of the unspaced cards before seeing the spaced cards of B; the opposite condition prevailed with the Y subjects. It was hoped that this criss-cross or fatigue-order system might serve to prevent any factor of learning from vitiating the results, as between A and B, in the repeating of A's letters in the B cards.

To avoid unnecessary fatigue, experimental sessions of not more than an half hour's duration were arranged. No further control, however, of fatigue factors or of the intervals between experiments was found possible with as large a group of subjects as thirty.

The following complete, typed instructions were read to each subject just prior to each of the first three sessions:

> Fixate the center of the lighted area. I shall expose for a fraction of a second cards which carry various arrangements of letters. These letters will appear near the center of the lighted area. You are to

record on the recording pad at your right, when they have disappeared, whatever letters you saw or believe you saw. If you are aware of the presence of letters which you cannot record, place a dash for each of such unrecalled letters in its proper position. There will be four blank exposures preliminary to the experiment proper. I shall say "ready!" and the exposure will occur soon afterward.

The above instructions, after the first three sessions with each subject, were found to be superfluous and were discontinued. Thereafter, the experiment began with the simple, "Fixate the center of the lighted area—I shall give you four blank exposures." After the presentation of each card, just as the subject recorded the letters which he had just perceived, the experimenter replaced the card with the next one. The subject indicated his readiness for the next exposure by writing a specified number opposite his record and by readjusting his chin and eyes to the chin-rest and hood of the tachistoscope. At this instant the experimenter gave a "ready" signal and, after an interval of one second, presented the next card by touching the control peg of the timing device. No formal introspective notes were taken, although the experimenter listened indulgently to the various comments from each subject; some of these comments have been used as the basis of a suggestion later in this paper of what processes are covered by the term "apprehension."

## METHODS OF TABULATING AND SCORING

The results of each set of exposures of each subject were transferred from the record pad to large sheets of coördinate paper, a separate sheet for each series. At the left-hand side was listed the original or objectively correct arrangement of letters and in successive columns to the right the letters as they were recalled and located by each of the thirty subjects. A detailed comparison of the actual and the perceived and recalled arrangement was thus easily effected. An arbitrary system of scoring, whereby three points were allowed for each correct letter properly placed and two points were allowed for each correct letter wrongly placed, was adopted. It will be noted that omitted, distorted, and substituted letters were

ignored except in so far as they had appreciable effects which are already contained in the above two criteria of correctness. When all the scores had been gathered into tables, a great many statistical computations were instituted. Since this paper attempts no quantitative definition of "range" and presents no thresholds which define "range," and since no attempt has been made to study individual differences, we have totaled all scores for a given person under a given condition of type, and the totals of all persons have been, in most of the tables, pooled together. This scheme avoids perhaps the unstableness of percentages but it is one of total scores and not one of mean scores (five samples of each number of letters and forty samples for a series being the base for each person's total score). The scheme furnishes an easy means of ascertaining group-differences, if and when such differences in pooled scores are proved to be so significant as to be expected to exceed zero in a very large number of cases in each 100 chances. Several intercorrelations have been computed and two sets of reliability coefficients. The scores have been presented graphically in one instance and a learning curve has been constructed.

## RESULTS AND THEIR INTERPRETATION

Reference to table 1a will reveal that exceedingly high correlations have obtained between all series, that is, between the ranks of 30 subjects by total scores each on the seven conditions of type used on the cards. These rank-differences coefficients were obtained with Pearson's formula.[3] Since all of these values are high, one would naturally conclude that the factor, or the factors, measured in any one of them is also measured in every other series. The reliability of the experiment as a whole may, on this ground, be regarded as being exceedingly high when we do not forget that group, rather than individual, differences are to be considered. It may be objected that these high

[3] Rho equals $1 - \frac{6\epsilon d^2}{N(N^2-1)}$, and $r$ being inferred from rho. In the employment of statistical methods we have been assisted by Mr. H. R. Taylor, of the Department of Psychology.

TABLE 1A

*Correlation coefficients between the seven series based on total scores, A records pooled with B records, for thirty subjects (rank differences method)*

All $r$'s are plus and all P.E.$_{r's}$ are plus or minus

| | SERIES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | | II | | III | | IV | | V | | VI | |
| | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. |
| II | 0.96 | 0.01 | | | | | | | | | | |
| III | 0.94 | 0.016 | 0.94 | 0.016 | | | | | | | | |
| IV | 0.94 | 0.016 | 0.94 | 0.015 | 0.94 | 0.016 | | | | | | |
| V | 0.93 | 0.018 | 0.96 | 0.01 | 0.96 | 0.01 | 0.94 | 0.016 | | | | |
| VI | 0.80 | 0.046 | 0.84 | 0.038 | 0.86 | 0.034 | 0.79 | 0.048 | 0.87 | 0.03 | | |
| VII | 0.92 | 0.02 | 0.93 | 0.017 | 0.95 | 0.014 | 0.90 | 0.024 | 0.94 | 0.016 | 0.80 | 0.046 |

TABLE 1B

*The coefficients of table 1a arranged in an order of descending magnitudes*

| $r$ | SERIES COMPARED | $r$ | SERIES COMPARED | $r$ | SERIES COMPARED |
|---|---|---|---|---|---|
| 0.96 | I and II | 0.94 | II and IV | 0.90 | IV and VII |
| 0.96 | II and V | 0.94 | III and IV | 0.87 | V and VI |
| 0.96 | III and V | 0.94 | IV and V | 0.86 | III and VI |
| 0.95 | III and VII | 0.94 | V and VII | 0.84 | II and VI |
| 0.94 | I and III | 0.93 | I and V | 0.80 | I and VI |
| 0.94 | I and IV | 0.93 | II and VII | 0.80 | VI and VII |
| 0.94 | II and III | 0.92 | I and VII | 0.79 | IV and VI |

TABLE 2

*Showing coefficients of reliability—correlations of ranks of 30 subjects in each series between first and second presentations (A and B) by total scores*

All coefficients are plus

| | SERIES | | | | | | |
|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII |
| $r$..... | 0.88 | 0.92 | 0.90 | 0.87 | 0.96 | 0.73 | 0.89 |

values arise from overlapping or partially coextensive series, from letters which are common to two or more series. While it is true that Series I, containing all letters of the alphabet, is partially coextensive with all other series, and that Series II and V, combined, when compared with Series III and IV and VII, contain overlapping or common letters, still unrelated series, such as II and V, show very high coefficients. If we will arrange the coefficients in the order of the greatest through the least magnitude, as is done in table 1b, we will find that the lowest coefficient (0.79) obtains between the partially coextensive Series IV and VI composed of curved and curved-vertical letters. The highest value (0.96) occurs three times: with Series III and V which have letters in common; with Series I and II which are partially coextensive; and with Series II and V which have no letters in common. It is to be observed, moreover, that Series VI, when compared with the other six series, gives the lowest coefficients obtained. The fact that Series VI contained the letters p, d, b, and q, the most strikingly different set of letters of the whole experiment, may have caused these values to be low. Also the computations of reliabilities by correlating the A with the B records in each series (table 2) show the reliability of Series VI to be lower than that for any other series. Because of these two facts, the low values of correlation accompanying Series VI, we must conclude that the contents of VI must have given rise to the differences; we must conclude likewise that all differences shown in table 1 must have arisen from the differences between the materials of all series and that the same ability or factor of efficiency was being measured throughout all series and throughout conditions A and B.

An examination of the total scores of the thirty subjects, pooled together, in each of the seven series, tables 3 and 4, reveals the fact that the crossing of the X and Y groups of subjects did not succeed in eliminating or circumventing the factor of learning from intruding itself in both A and B. This result is unmistakable if the sum of total scores of group X for cards A and group Y for cards B is subtracted from the sum of the X

total scores in B and the Y total scores in A. A saving is here apparent which amounts to as much as 12.5 per cent, and this has resulted from the repetition of cards in A and B (with and without the inter-letter hair-spacing) in the last half of the experiment. Reference to table 4, which shows the total scores of all subjects pooled for each of the series which are most comparable—Series I, II, V, and VII,—(since all other series

TABLE 3

*Showing total point scores of all subjects, pooled, for each series, arranged in the order of presentation and percentage increases of the second presentation over the first*

| | SERIES | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | |
| Second presentation. | 12,358 | 12,490 | 6,881 | 8,500 | 11,629 | 4,189 | 13,057 | 69,104 |
| First presentation... | 9,608 | 10,641 | 6,103 | 7,827 | 10,989 | 3,853 | 12,370 | 61,391 |
| Increase..... | 2,750 | 1,849 | 778 | 673 | 640 | 336 | 687 | 7,713 |
| Per cent of Increase. | 28.6 | 17.4 | 12.7 | 8.6 | 5.8 | 8.7 | 5.5 | 12.5 |

TABLE 4

*Derived from the values contained in table 3 and showing the progressive increase in the total scores for comparable series—I, II, V, and VII—for the first and second presentations*

| | SERIES | | | |
|---|---|---|---|---|
| | I | II | V | VII |
| First presentation..... | 9,608 | 10,641 | 10,989 | 12,370 |
| Second presentation..... | 12,358 | 12,490 | 11,629 | 13,057 |

contained cards with unequal numbers of letters and an unequal number of cards) will demonstrate the presence of learning quite unmistakably. There is a progressive gain as one proceeds from series to series in the order of their presentation; moreover, the progression continues into and through the order of the second presentation. A graphic representation of the data of table 4, in figure 3, exhibits a curve which approximates

the shape of the conventional learning curve, with its initial rapid ascent and its then gradual approach to the asymptote. Such improvement, or gain in range, as is shown in figure 3 appears to be largely a product of increasing adjustment to the experimental conditions and not, in any great measure, arising from memory of a liminal sort of the letters which had been presented at an earlier date. In fact, all subjects remarked upon the apparent novelty of all cards, including those of the second presentation. If the former cards had been recalled

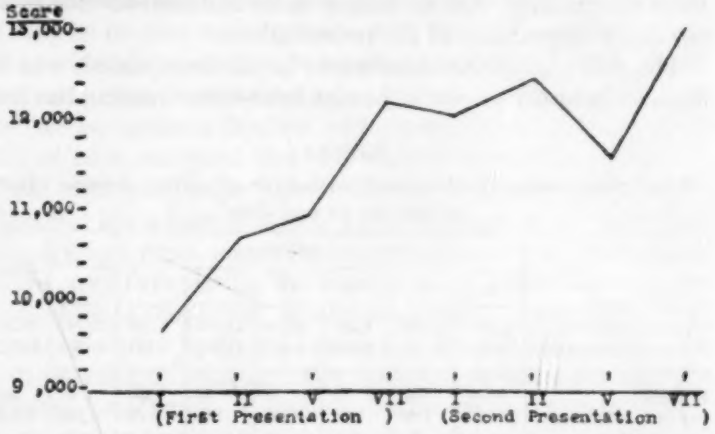


FIG. 3. SHOWING PROGRESSIVE INCREASE IN TOTAL SCORES OF COMPARABLE SERIES I, II, V AND VII FOR FIRST AND SECOND PRESENTATIONS

directly, in subsequent sessions, it would be reasonable to expect a percentage increase in range equal or nearly so in all series causing the curve to more nearly approach a straight line in its progression. The only scheme by which the factor of learning could have been entirely curtailed or counterweighted would be the employment of a double-fatigue order of presentation of the four series, the sequence of I, II, V, and VII, followed by VII, V, II, and I. Even a precautionary measure such as this could not have succeeded in preventing the inclusion of learning within each of the first and second presentations, that is, from

Series I to VII and from VII to I; but the two instances of learning, in opposite progressions, would in the combined scores have effaced one another. Then such differences between series as have arisen from the different groups of letters would have been larger and far more significant than they are at present. Inasmuch as the senior author of this paper, believing that a fatigue-order as planned was being used, was a subject in the experiment he could not more closely direct it so that the fatigue-order would not be lacking. The discovery, after the experiment was finished, that no fatigue-order had been effected came too late to repeat any of the presentations.

The first aim of the experiment, as has been stated, was to discover whether or not a ½-point inter-letter spacing has any

TABLE 5

*Total point scores of all subjects pooled for all series, showing effect of spacing on legibility*

| | SERIES | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | |
| B—Cards (spaced).... | 10,909 | 11,660 | 6,582 | 8,200 | 11,327 | 4,101 | 12,743 | 65,522 |
| A—Cards (unspaced). | 11,057 | 11,471 | 6,402 | 8,127 | 11,291 | 3,941 | 12,684 | 64,973 |
| Increase..... | −148 | 189 | 180 | 73 | 36 | 160 | 59 | 549 |
| Per cent of increase.. | −1.33 | 1.64 | 2.81 | 0.89 | 0.318 | 4.06 | 0.465 | 0.845 |

effect upon legibility as measured by any effect upon range of apprehension. To answer the question, for each series and for the experiment as a whole, a comparison has been made between the unspaced (A) and the spaced (B) total scores for all subjects pooled together in table 5. Except for Series I, containing the whole alphabet, a slight increase in range is demonstrated in favor of the spaced cards. This increase, however, for the entire seven series amounts to only 0.845 per cent, an amount so small as to be almost entirely negligible. Nevertheless, all such differences, save that for Series I, are plus or positive differences. If such differences arose from chance alone, it is reasonable to have expected an equal number of positive and negative differences in the whole group of series. Three factors, we

believe, contributed to the production of the smallness of the values of six of the differences and the negative character of the other difference. First, it is conceivable, and there is some evidence in the literature (28, p. 146 f) to support the hypothesis, that range of attention is somewhat independent of inter-letter spacing, since range of attention and sensory acuity (legibility) are not one and the same functions. Second, the spacing employed amounted to only ½-point, approximately 0.176 mm., certainly an amount far smaller than the width of any individual letter which Hollingworth[4] has maintained would always be an inter-letter spacing with disastrous consequences; this spacing is so small as to be almost negligible. And, third, ordinary, clean lower-case Caslon body-type was employed on the cards;—anyone familiar with conventional printing types will at once recognize that the various letters have different thicknesses and, regardless of shape, width, or height, each character has a base or matrix which is square or rectangular in shape, a fact which makes for various sizes of inter-letter spaces in the very type itself. For example, it is notorious in print-shop practice that a "w" in inter-letter hair-spaced matter need not be preceded by such a hair-space, since the "w" carries its own shoulder or spacing. The facts just enumerated, and the shapes of the letters themselves, make certain characters contrast greatly in appearance and other characters contrast less greatly. It is obvious, therefore, that, without constructing the type ourselves, we had no means of controlling these prior conditions. To clear up the issue would require that the experiment be repeated with such cards as were used with the addition of cards with two, three, four, and so on, hair-spaces interspersed between the characters, until a spacing approximating the widths of the letters had been attained. In view of these four more or less extraneous factors, it may be argued, in company with Tryon,[5] that any differences which have been exhibited as between B and A are all the more significant. It

[4] Advertising and Selling. D. Appleton and Company, New York, 1920, p. 178 f.

[5] Jour. of Compar. Psychol., 1926, vol. 6, 449-453.

is not impossible that inter-letter hair-spacing has a relatively greater effect upon range when the characters perceived lack shape contrast. Series VI, according to this supposition, containing the letters p, d, b, and q, letters which are very similar in appearance, should show a relatively very large effect of spacing. Reference to table 5 confirms this expectation with an increase which amounts to 4.06 per cent for Series VI. On the other hand, Series I, containing all the letters thus affording various contrasts, should show the smallest increase. This it does by exhibiting an actual decrease instead of an increase. Series VII, containing many dissimilar letters among the verticals, gave next to the lowest increase, namely 0.465 per cent. Series III, by containing as greatly similar the letters v, w, and y and as not greatly dissimilar the letters z, x, and k, gave next to the highest increase, 2.81 per cent.

The failure to procure a double-fatigue order of the presentation of the various series allowed the entrance of a practice-effect, thus making difficult any valuable comparison of series with series for discovering the effects on range of the various groupings of letters. The problem, however, is not wholly inscrutable. There remains Series I, itself alone, which, by containing all characters, should lend itself to the purpose of such comparisons. Consequently, we have made a letter-by-letter study of the results in Series I. This analysis yields five sets of results: first, the influence of position on the card on the correctness, misplacement, and omission of characters; second, the relative ranges for various sizes of groups of letters; third, intercorrelations between the ranks of the various subjects' scores for various sizes of letter-groups; fourth, the most frequently recalled and the most frequently missed individual letters; and, five, the most frequent correct and the most frequent incorrect groups of letters by group characteristics.

In view of certain results which have been reviewed in Crosland's monograph (28, pp. 147 f, 150), namely, to the effect that visual fixation falls dominantly upon the first third or first half of a word in reading,—that supplementation in perception during reading proceeds from left to right in occidental subjects,

TABLE 6

*Showing the relative frequency of Correct Letters, Errors in Position and Omissions from left to right on exposure cards, all subjects, Series I*

| | A CARDS (UNSPACED) | | | | | | | | | | B CARDS (SPACED) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Position of letters on card | | | | | | | | | | Position of letters on card | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Correct:* | | | | | | | | | | | | | | | | | | | | |
| Group X—A and B | 516 | 322 | 236 | 137 | 47 | 26 | 8 | 4 | 4 | | 576 | 466 | 381 | 219 | 90 | 44 | 15 | 5 | 3 | 1 |
| Group Y—B and A | 586 | 464 | 372 | 227 | 86 | 43 | 17 | 4 | 2 | 1 | 514 | 317 | 215 | 143 | 48 | 24 | 15 | 3 | 4 | |
| Total | 1,102 | 786 | 608 | 364 | 133 | 69 | 25 | 8 | 6 | 1 | 1,090 | 783 | 596 | 362 | 138 | 68 | 30 | 8 | 7 | 1 |
| Per cent of Maximum Score | 0.861 | 0.614 | 0.475 | 0.325 | 0.138 | 0.086 | 0.039 | 0.017 | 0.019 | 0.006 | 0.851 | 0.612 | 0.465 | 0.323 | 0.144 | 0.08 | 0.047 | 0.017 | 0.022 | 0.006 |
| *Wrong Position:* | | | | | | | | | | | | | | | | | | | | |
| Group X—A and B | 13 | 71 | 115 | 110 | 82 | 87 | 51 | 26 | 31 | 12 | 10 | 52 | 109 | 134 | 77 | 95 | 55 | 22 | 36 | 14 |
| Group Y—B and A | 10 | 45 | 104 | 125 | 100 | 83 | 56 | 28 | 31 | 10 | 24 | 58 | 122 | 129 | 98 | 79 | 52 | 32 | 38 | 20 |
| Total | 23 | 116 | 219 | 235 | 182 | 170 | 107 | 54 | 62 | 22 | 34 | 110 | 231 | 263 | 175 | 174 | 107 | 54 | 74 | 34 |
| Per cent of Maximum Score | 0.018 | 0.09 | 0.17 | 0.209 | 0.189 | 0.21 | 0.167 | 0.113 | 0.194 | 0.137 | 0.026 | 0.086 | 0.180 | 0.235 | 0.182 | 0.217 | 0.17 | 0.11 | 0.231 | 0.213 |
| *Missed:* | | | | | | | | | | | | | | | | | | | | |
| Group X—A and B | 111 | 247 | 289 | 313 | 351 | 287 | 261 | 210 | 125 | 68 | 54 | 122 | 150 | 207 | 313 | 261 | 250 | 213 | 121 | 65 |
| Group Y—B and A | 44 | 131 | 164 | 208 | 294 | 274 | 247 | 208 | 127 | 69 | 102 | 265 | 303 | 288 | 334 | 297 | 253 | 205 | 118 | 60 |
| Total | 155 | 378 | 453 | 521 | 645 | 561 | 508 | 418 | 252 | 137 | 156 | 387 | 453 | 495 | 647 | 558 | 503 | 418 | 239 | 125 |
| Per cent of Maximum Score | 0.121 | 0.295 | 0.354 | 0.465 | 0.672 | 0.701 | 0.794 | 0.87 | 0.787 | 0.856 | 0.122 | 0.302 | 0.354 | 0.442 | 0.674 | 0.697 | 0.786 | 0.871 | 0.747 | 0.7 |
| Maximum Score | 1,280 | 1,280 | 1,280 | 1,120 | 960 | 800 | 640 | 480 | 320 | 160 | 1,280 | 1,280 | 1,280 | 1,120 | 960 | 800 | 640 | 480 | 320 | 160 |

—and that words lacking their last halves are more quickly and more accurately read than words lacking their first halves, —and in view of certain supplementary studies which have been made of his original proofsheets, special note has been made of the effects on the accuracy of perception and recall of the various

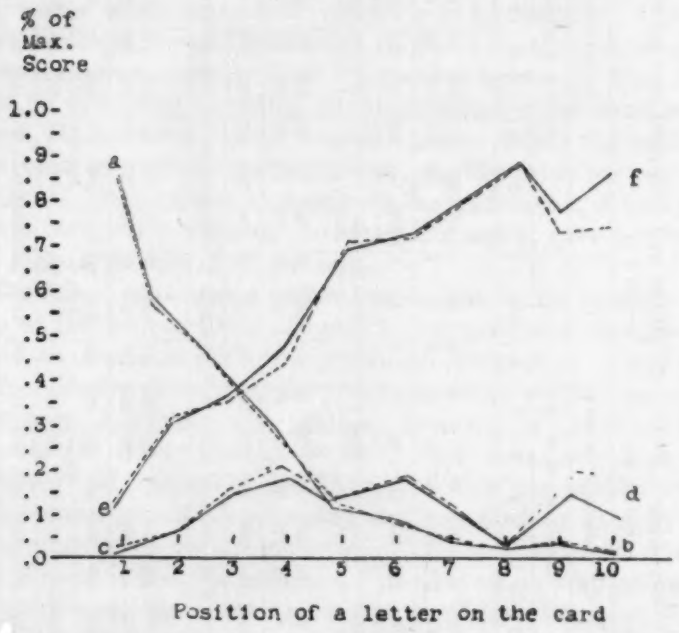


FIG. 4. SHOWING THE RELATIVE FREQUENCIES OF CORRECT LETTERS, ERRORS IN POSITION, AND OMISSIONS, FROM LEFT TO RIGHT ON EXPOSURE CARDS, SERIES I

*A*, cards, solid lines; *B*, cards, hyphenated lines. Correct, lines *ab;* Wrong Position, lines *cd;* Missed, lines *ef*.

letters resulting from their positions on the cards. Table 6 contains both the absolute total and percentage score for all letters by positions on the exposure-cards as being wholly correct, misplaced, and omitted entirely. It will be observed from this table that almost no difference exists between A

and B when the whole group of 30 subjects or the collection of total scores is considered. For example, we find in the A records an 86.1 per cent score of accuracy for the first-position wholly correct characters while in B the same position yields a score of 85.1 per cent. The scores for the second-position letters for A and B are 61.4 and 61.2 per cent, respectively; and for the sixth-position letters, 8.6 and 8.05 per cent, respectively, and so on. Misplacements in the positions of the letters seldom occur in the first and second positions from the left side of the card. The fourth, fifth, and sixth positions seem to be the favored positions of letters which are most frequently misplaced; such letters here as are misplaced are however letters correct in every other respect. Figure 4 will represent graphically the values of the various positions from left to right for correct reproduction, misplacement, and omission. It is evident that the percentage of letters correct in all respects decreases gradually and consistently from left to right, a result quite similar to results which were quoted by Crosland (28) but probably not related to his discovery that the proofreader will commit his most frequent errors in the extreme right quarter of a galley of proof nor to his discovery that inaccuracy in reading proof becomes progressively greater from left to right across the line of print. The perceiving of letters grouped at random during one fixation-pause of 150 sigmas' duration is quite a different phenomenon from the sequence of fixations and saccadic movements which accompany perception during ordinary reading. The percentage of letters missed entirely, indicated by lines *ef*, steadily increases from left to right, except for a slight drop which occurs at position number nine. In the line *cd*, representing a fairly stationary percentage of letters which are misplaced, another drop occurs at the eighth position. These two drops, evidence of reductions instead of gains in percentage values, may be interpreted as having resulted from a strong tendency in all subjects to succeed in catching the last letter on the card with however a frequency somewhat lower than that for the first letter. For example, in a 10-letter group, such as gphqiaswtr, a typical record would resemble the following:

ghq-r, r being given the final position which was its position on the card, if the card is studied from right to left, but is a wrong position by five spaces if the card is studied from left to right. Those letters correctly perceived but incorrectly placed were quite often misplaced by as many as four or five spaces though their relative positions frequently were correct, that is, last or next to last in any letter-group.

Although we have employed no means of presenting in statistical form results concerning individual differences, nevertheless there are unmistakable indications of differences between subjects with respect to width of range and with respect to where, within a letter-group, range concentrated or dispersed itself. There were those subjects who consistently perceived and correctly reproduced the first three or four letters, regardless of how many characters were represented on the card; —we shall call them the "narrow-accurate" subjects. There were those whose range increased somewhat in proportion to the increase in the numbers of letters presented;—call them the "broad-accurate" subjects. And there were those subjects whose range included discursively or discretely characters scattered here and there on the cards and whose attention also appeared both to widen and to thin as the number of characters increased;—"scattered-thin" will serve as an appellation by which to refer to them. Thus, with a card containing few letters, the third type of subject would recall and correctly place the letters, but, beyond a certain number of letters (varying with the subjects in this class), the characters, though correctly recalled, would be inaccurately localized and the range score would consequently then be reduced. In the pooled or total scores for all subjects the differences between these types naturally cancel one another. It is in the upper numbers of letters per card that they make their presence obvious. Reference to table 7 will bring to light the types: Subjects 8 and 21, showing fairly consistent low scores throughout all cards, from the 3's through the 10's, belong to the "narrow-accurate" type; subjects 20 and 26, by exhibiting a somewhat consistent increase in the sizes of their ranges as the number of letters per

TABLE 7

*Showing total point score of each subject on the different letter-group cards,* Series I*

| | | LETTERS PER CARD | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 3's | 4's | 5's | 6's | 7's | 8's | 9's | 10's |
| 1 | Hm | 83 | 94 | 101 | 110 | 114 | 97 | 98 | 101 |
| 2 | Mc | 70 | 84 | 74 | 84 | 87 | 90 | 96 | 82 |
| 3 | Py | 76 | 65 | 98 | 79 | 83 | 76 | 65 | 87 |
| 4 | KW | 78 | 108 | 122 | 107 | 93 | 96 | 98 | 101 |
| 5 | HB | 88 | 88 | 102 | 135 | 142 | 115 | 132 | 133 |
| 6 | HO | 83 | 117 | 124 | 128 | 118 | 105 | 109 | 89 |
| 7 | By | 27 | 35 | 29 | 30 | 23 | 25 | 43 | 32 |
| 8† | Wm | 62 | 88 | 84 | 70 | 54 | 61 | 67 | 72 |
| 9 | Cm | 85 | 114 | 124 | 142 | 150 | 128 | 130 | 135 |
| 10 | Tw | 81 | 98 | 103 | 106 | 77 | 85 | 81 | 95 |
| 11 | Sp | 86 | 110 | 126 | 142 | 161 | 120 | 133 | 147 |
| 12 | PW | 86 | 111 | 114 | 118 | 106 | 98 | 99 | 99 |
| 13 | Wy | 51 | 50 | 88 | 87 | 63 | 72 | 67 | 83 |
| 14 | Cr | 81 | 99 | 87 | 71 | 80 | 74 | 66 | 65 |
| 15† | Mk | 69 | 89 | 107 | 101 | 94 | 71 | 91 | 72 |
| 16 | Tr | 64 | 90 | 81 | 70 | 66 | 83 | 74 | 84 |
| 17 | Dr | 85 | 110 | 122 | 130 | 136 | 119 | 98 | 121 |
| 18 | Hz | 69 | 96 | 77 | 90 | 81 | 80 | 82 | 84 |
| 19 | Bs | 86 | 112 | 112 | 107 | 95 | 97 | 106 | 103 |
| 20† | Bg | 80 | 95 | 100 | 107 | 112 | 105 | 117 | 119 |
| 21† | Ta | 63 | 60 | 82 | 72 | 63 | 58 | 78 | 62 |
| 22 | Ko | 75 | 108 | 119 | 94 | 89 | 96 | 103 | 90 |
| 23 | Jo | 83 | 101 | 82 | 101 | 83 | 84 | 84 | 80 |
| 24 | Be | 75 | 97 | 102 | 69 | 73 | 77 | 82 | 89 |
| 25 | Mr | 74 | 99 | 117 | 118 | 97 | 112 | 91 | 99 |
| 26† | Dv | 79 | 105 | 123 | 127 | 138 | 122 | 120 | 136 |
| 27 | Bu | 88 | 114 | 122 | 137 | 101 | 112 | 123 | 104 |
| 28† | Cn | 77 | 108 | 90 | 107 | 74 | 75 | 77 | 55 |
| 29 | Su | 87 | 102 | 108 | 130 | 100 | 84 | 89 | 112 |
| 30 | De | 45 | 33 | 42 | 61 | 32 | 40 | 50 | 66 |

* Five cards in each group.

† Subjects best representing special types, as described in text.

card-group increases, place themselves in the "broad-accurate" class; and subjects 15 and 28, manifesting widenings with the consequent thinnings in range, with a general reduction in

TABLE 8A

*Correlations between the scores made by all subjects on the different letter-group cards of Series I*

(By Differences in Rank—30 Subjects)

All $r$'s are plus and all P.E.$_{r's}$ are plus or minus

| | LETTERS PER CARD | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3's | | 4's | | 5's | | 6's | | 7's | | 8's | | 9's | |
| | r | P.E. | r | P.E. | r | P.E. | r | P.E. | r | P.E. | r | P.E. | r | P.E. |
| 4's | 0.74 | 0.058 | | | | | | | | | | | | |
| 5's | 0.667 | 0.07 | 0.81 | 0.044 | | | | | | | | | | |
| 6's | 0.84 | 0.038 | 0.736 | 0.059 | 0.82 | 0.042 | | | | | | | | |
| 7's | 0.798 | 0.047 | 0.65 | 0.074 | 0.80 | 0.046 | 0.917 | 0.02 | | | | | | |
| 8's | 0.75 | 0.056 | 0.707 | 0.064 | 0.79 | 0.048 | 0.87 | 0.03 | 0.92 | 0.019 | | | | |
| 9's | 0.796 | 0.047 | 0.677 | 0.07 | 0.78 | 0.05 | 0.85 | 0.036 | 0.91 | 0.022 | 0.90 | 0.024 | | |
| 10's | 0.78 | 0.05 | 0.578 | 0.086 | 0.78 | 0.05 | 0.827 | 0.041 | 0.87 | 0.03 | 0.908 | 0.023 | 0.84 | 0.038 |

TABLE 8B

Data of table 8A rearranged

| r | CARDS | v | r | CARDS | v | r | CARDS | v | r | CARDS | v |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.92 | 7's and 8's | 1 | 0.85 | 6's and 9's | 3 | 0.798 | 3's and 7's | 4 | 0.74 | 3's and 4's | 1 |
| 0.917 | 6's and 7's | 1 | 0.84 | 9's and 10's | 1 | 0.796 | 3's and 9's | 6 | 0.736 | 4's and 6's | 2 |
| 0.91 | 7's and 9's | 2 | 0.84 | 3's and 6's | 3 | 0.79 | 5's and 8's | 3 | 0.707 | 4's aad 8's | 4 |
| 0.908 | 8's and 10's | 2 | 0.827 | 6's and 10's | 4 | 0.78 | 5's and 9's | 4 | 0.677 | 4's and 9's | 5 |
| 0.90 | 8's and 9's | 1 | 0.82 | 5's and 6's | 1 | 0.78 | 5's and 10's | 5 | 0.667 | 3's and 5's | 2 |
| 0.87 | 7's and 10's | 3 | 0.81 | 4's and 5's | 1 | 0.78 | 3's and 10's | 7 | 0.65 | 4's and 7's | 3 |
| 0.87 | 6's and 8's | 2 | 0.80 | 5's and 7's | 2 | 0.75 | 3's and 8's | 5 | 0.578 | 4's and 10's | 6 |

$r$ equals the amount of correlation, "Cards" equals the number of letters on the cards, $v$ equals the variation in position of the cards which are compared on either side.

range score following critical points in the increase of the number of letters, belong to the "scattered-thin" denomination of subjects. The latter type constituted by far the largest group of persons engaging in the experiment.

Table 8a contains the coefficients[6] of correlation which were obtained between the ranks of the 30 subjects in the 3-letter, 4-letter, 5-letter, through the 10-letter card-group scores in Series I. The chief aspect of these coefficients is the fact that there is a decided tendency for the higher correlations to appear as between ranks for scores upon closely adjacent numbers of letters, such as between the ranks for the 4's when compared with the ranks for the 3's or the 5's. A rearrangement of these coefficients in the order of their descending magnitudes, table 8b, will bring this fact out more clearly. If we take the fourteen highest coefficients, one-half the total number; and add together the number of positions (v's) by which the compared items varied in location one from another, we obtain a mean of 1.93 places; likewise, the mean of the displacements of the fourteen lowest coefficients gives a value of 4.07 places. That is to say, the correlation is very likely to be high if the compared items are not far removed numerically one from the other, and low if the items are not closely adjacent. Similarly, if we take the three closest positions (smallest v's), the 1's, 2's, and 3's (18 cases), and find the mean of their respective coefficients, it amounts to 0.824. The means of the coefficients of the farthest positions or largest v's (5's, 6's, and 7's, only 6 cases in all) is found to be 0.727. If we go so far as to add the 4-v's (the median positions) in the group of the largest v's, making 10 cases in all, we obtain a mean of 0.756. So, again, it seems quite clear that the nearer numerically are the items, the ranks for which are

[6] These were computed by the formula cited in footnote 3, p. 89, where $r$ is inferred from rho by using Table XX in Garrett's "Statistics in Psychology and Education," page 192. And, since error may be introduced in such computations if they are directed at ranks which have been divided between several subjects, we have gone to the pains of calculating the amount of this error for the largest of such divisions of ranks (table 7, the 6's) and have found it to be negligible.

TABLE 9

*Showing letters in order of legibility all subjects, Series I*

*(Note: All scores, save the Missed scores, are in a descending order)

| CORRECT | | | | | | WRONG POSITION | | | | | | MISSED | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A cards | | B cards | | Total | | A cards | | B cards | | Total | | A cards | | B cards | | Total | |
| y | 174 | y | 173 | y | 347 | m | 81 | k | 97 | k | 177 | i | 93 | i | 100 | i | 193 |
| i | 162 | i | 161 | i | 323 | k | 80 | m | 71 | m | 152 | m | 115 | l | 100 | l | 221 |
| j | 160 | j | 159 | j | 319 | i | 65 | l | 65 | i | 124 | y | 118 | k | 108 | y | 228 |
| d | 157 | l | 155 | l | 308 | n | 57 | o | 62 | o | 113 | j | 119 | y | 110 | k | 237 |
| l | 153 | t | 142 | d | 299 | r | 53 | i | 59 | n | 113 | l | 121 | f | 129 | m | 250 |
| e | 149 | d | 142 | e | 287 | o | 51 | n | 56 | l | 111 | e | 122 | t | 133 | f | 255 |
| f | 148 | e | 138 | f | 284 | z | 51 | f | 55 | r | 106 | f | 126 | d | 134 | j | 257 |
| u | 144 | f | 136 | u | 278 | s | 49 | r | 53 | z | 103 | d | 127 | m | 135 | d | 261 |
| g | 130 | u | 134 | t | 272 | e | 49 | w | 52 | f | 101 | k | 129 | u | 136 | e | 262 |
| t | 130 | w | 130 | w | 259 | t | 46 | a | 52 | w | 94 | o | 141 | j | 138 | t | 277 |
| w | 129 | b | 124 | g | 252 | l | 46 | z | 52 | a | 93 | t | 144 | w | 138 | u | 280 |
| o | 128 | g | 122 | o | 246 | f | 46 | p | 51 | p | 92 | u | 144 | o | 140 | o | 281 |
| m | 124 | o | 118 | m | 238 | h | 43 | u | 50 | e | 91 | w | 149 | e | 140 | w | 287 |
| s | 117 | r | 116 | b | 230 | w | 42 | t | 45 | s | 91 | r | 154 | r | 151 | r | 305 |
| r | 113 | k | 115 | r | 229 | a | 41 | d | 44 | t | 91 | s | 154 | z | 157 | z | 327 |
| h | 112 | m | 114 | k | 226 | c | 41 | s | 42 | c | 82 | h | 165 | g | 165 | s | 329 |
| k | 111 | z | 111 | h | 223 | j | 41 | e | 42 | u | 82 | g | 166 | b | 174 | g | 331 |
| x | 109 | h | 111 | s | 220 | p | 41 | c | 41 | q | 81 | z | 170 | c | 175 | h | 341 |
| b | 106 | x | 105 | x | 214 | x | 41 | q | 41 | d | 80 | x | 170 | s | 175 | x | 346 |
| c | 104 | c | 104 | z | 210 | q | 40 | v | 39 | x | 80 | c | 175 | x | 176 | c | 350 |
| z | 99 | s | 103 | c | 208 | v | 38 | x | 39 | v | 77 | p | 182 | h | 176 | p | 359 |
| p | 97 | p | 92 | p | 189 | d | 36 | y | 37 | h | 76 | b | 186 | p | 177 | b | 360 |
| a | 70 | a | 83 | a | 153 | u | 32 | h | 33 | y | 65 | a | 209 | a | 185 | a | 394 |
| v | 68 | v | 80 | v | 148 | b | 28 | g | 33 | j | 64 | n | 213 | v | 201 | v | 415 |
| q | 58 | q | 64 | q | 122 | y | 28 | j | 23 | g | 57 | v | 214 | n | 213 | n | 426 |
| n | 50 | n | 51 | n | 101 | g | 24 | b | 22 | b | 50 | q | 222 | q | 215 | q | 437 |

Correlations by ranks of letters:

A and B cards (correct)..... $r = +0.945$

A and B cards (wrong position)..... $r = +0.775$

A and B cards (missed)..... $r = +0.82$

*r*'s between Total scores:

Correct and Missed..... +0.87*

Correct and Wrong Position..... −0.05

Missed and Wrong Position..... +0.35*

correlated, the higher will become the coefficient of such a correlation. This fact merely proves the high reliability of the experiment by proving that, given cards of the same or nearly the same numbers of letters, the 30 subjects will fall into almost the same rank positions of efficiency, but given cards of widely differing numbers of letters, the subjects will assume different rank positions since variations in ability are now called out and hence many diverse factors are present in the preceptions of large groups of letters on the cards.

The relative legibility, that is, the relative effect upon range, of the individual characters of the entire alphabet was checked in the three ways which have been described on page 88f, that is, by scoring the totals of each letter as being entirely correct, as correct but misplaced, and as being omitted entirely in only Series I. Table 9 lists the various letters in the order of their effects upon range for each of the categories of scoring,—correct, wrong position, and missed—for each of conditions A and B. It is not surprising that the order of rank of scores for correct letters is greatly similar to that of scores for missed letters (the latter being reversed into an ascending order); but the failure of the two to be wholly identical arose from the fact that the misplaced letters exerted certain influences upon both of the ranks for correct and missed letter scores. Since the correlation of the ranks for scores of misplacement and of correct letters is negative and low, and since moreover the correlation between the former and missed letters is also low, it is found, as anticipated, that the coefficient between the correct and the missed is high (plus 0.87). We conclude from these values that if the correctly perceived and recalled letters are known, it is safe to predict that the same letters will not be frequently missed; that, by the same tokens, we cannot predict which letters will be misplaced; and that, knowing what letters are either misplaced or missed, we can come nearer predicting what letters have been missed or misplaced, respectively (this last correlation being too small, however, for safe prediction). For scores of entire correctness, there is almost no difference between the spaced and the unspaced cards; hair-spacing of one-half of

TABLE 10

*Re-arrangement of data derived from table 9 to show comparative legibility of Vertical, Curved-vertical, Diagonal and Curved letters*

| | | CORRECT | | | WRONG POSITION | | | MISSED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A cards | B cards | Total | A cards | B cards | Total | A cards | B cards | Total |
| Vertical | i | 162 | 161 | 323 | 65 | 59 | 124 | 93 | 100 | 193 |
| | n | 50 | 51 | 101 | 57 | 56 | 113 | 213 | 213 | 426 |
| | m | 124 | 114 | 238 | 81 | 71 | 152 | 115 | 135 | 250 |
| | u | 144 | 134 | 278 | 32 | 50 | 82 | 144 | 136 | 280 |
| | r | 113 | 116 | 229 | 53 | 53 | 106 | 154 | 151 | 305 |
| | l | 153 | 155 | 308 | 46 | 65 | 111 | 121 | 100 | 221 |
| | t | 130 | 142 | 272 | 46 | 45 | 91 | 144 | 133 | 277 |
| | h | 112 | 111 | 223 | 43 | 33 | 76 | 165 | 176 | 341 |
| | j | 160 | 159 | 319 | 41 | 23 | 64 | 119 | 138 | 257 |
| | f | 148 | 136 | 284 | 46 | 55 | 101 | 126 | 129 | 255 |
| Totals | | 1,296 | 1,279 | 2,575 | 510 | 510 | 1,020 | 1,394 | 1,411 | 2,805 |
| * | *M* | | | 257.5 | | | 102.0 | | | 280.5 |
| | $\sigma$ (dis.) | | | 62.3 | | | 24.1 | | | 62.2 |
| | $\sigma M$ | | | 22.0 | | | 8.5 | | | 21.9 |
| Curved-vertical | q | 58 | 64 | 122 | 40 | 41 | 81 | 222 | 215 | 437 |
| | b | 106 | 124 | 230 | 28 | 22 | 50 | 186 | 174 | 360 |
| | d | 157 | 142 | 299 | 36 | 44 | 80 | 127 | 134 | 261 |
| | p | 97 | 92 | 189 | 41 | 51 | 92 | 182 | 177 | 359 |
| Totals | | 418 | 422 | 840 | 145 | 158 | 303 | 717 | 700 | 1,417 |
| † | *M* | | | 210.0 | | | 75.7 | | | 354.2 |
| | $\sigma$ (dis.) | | | 64.2 | | | 18.0 | | | 62.4 |
| | $\sigma M$ | | | 64.2 | | | 18.0 | | | 62.4 |
| Diagonal | z | 99 | 111 | 210 | 51 | 52 | 103 | 170 | 157 | 327 |
| | v | 68 | 80 | 148 | 38 | 39 | 77 | 214 | 201 | 415 |
| | x | 109 | 105 | 214 | 41 | 39 | 80 | 170 | 176 | 346 |
| | w | 129 | 130 | 259 | 42 | 52 | 94 | 149 | 138 | 287 |
| | y | 174 | 173 | 347 | 28 | 37 | 65 | 118 | 110 | 228 |
| | k | 111 | 115 | 226 | 80 | 97 | 177 | 129 | 108 | 237 |
| Totals | | 690 | 714 | 1,404 | 280 | 316 | 596 | 950 | 890 | 1,840 |
| † | *M* | | | 234.0 | | | 99.3 | | | 306.7 |
| | $\sigma$ (dis.) | | | 60.3 | | | 36.8 | | | 64.7 |
| | $\sigma M$ | | | 34.8 | | | 21.3 | | | 37.4 |

TABLE 10—*Continued*

| | | CORRECT | | | WRONG POSITION | | | MISSED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A cards | B cards | Total | A cards | B cards | Total | A cards | B cards | Total |
| Curved | g | 130 | 122 | 252 | 24 | 33 | 57 | 166 | 165 | 331 |
| | e | 149 | 138 | 287 | 49 | 42 | 91 | 122 | 140 | 262 |
| | o | 128 | 118 | 246 | 51 | 62 | 113 | 141 | 140 | 281 |
| | s | 117 | 103 | 220 | 49 | 42 | 91 | 154 | 175 | 329 |
| | a | 76 | 83 | 153 | 41 | 52 | 93 | 209 | 185 | 394 |
| | c | 104 | 104 | 208 | 41 | 41 | 82 | 175 | 175 | 350 |
| Totals | | 698 | 668 | 1,366 | 255 | 272 | 527 | 967 | 980 | 1,947 |
| † | $M$ | | | 227.7 | | | 87.8 | | | 324.5 |
| | $\sigma$ (dis.) | | | 41.7 | | | 16.6 | | | 43.4 |
| | $\sigma M$ | | | 24.1 | | | 9.6 | | | 25.1 |

* Where $\sigma M = \frac{\sigma(\text{dis.})}{\sqrt{N-2}}$.

† Where $\sigma M = \frac{\sigma(\text{dis.})}{\sqrt{N-3}}$.

one point does not appreciably affect the ranking of the correct scores by individual letters, since the correlation is high (0.945). Such spacing, however, does have an effect upon the ranks of letters for misplacements and omissions amounting to as much as is indicated by the relative smallness of the correlations of 0.775 and 0.82, respectively.

If we will note, in table 9, the totals in columns one and two for the letters i, y, and l, we will find that these letters are included in the five most effective letters; likewise, we will discover that the letters a, v, q, and n are the four most ineffective or most difficult characters to perceive correctly. Because of the few cases in hand, it is inadvisable to generalize further with regard to the effects of the shapes of the most and the least effective characters, although it is observed that the most effective are of the extended or seraphed type and that i and y in addition possess a dot and a curved tail differing from the usual seraphs, characteristics which may be regarded as acting as "determiners" to attention. It is observed also that the most

TABLE 11

*Rearrangement of data derived from table 9 to show comparative legibility of Seraphed and Unseraphed letters*

| | | CORRECT | | | WRONG POSITION | | | MISSED | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A cards | B cards | Total | A cards | B cards | Total | A cards | B cards | Total |
| Unseraphed | a | 70 | 83 | 153 | 41 | 52 | 93 | 209 | 185 | 394 |
| | c | 104 | 104 | 208 | 41 | 41 | 82 | 175 | 175 | 350 |
| | e | 149 | 138 | 287 | 49 | 42 | 91 | 122 | 140 | 262 |
| | m | 124 | 114 | 238 | 81 | 71 | 152 | 115 | 135 | 250 |
| | n | 50 | 51 | 101 | 57 | 56 | 113 | 213 | 213 | 426 |
| | o | 128 | 118 | 246 | 51 | 62 | 113 | 141 | 140 | 281 |
| | r | 113 | 116 | 229 | 53 | 53 | 106 | 154 | 151 | 305 |
| | s | 117 | 103 | 220 | 49 | 42 | 91 | 154 | 175 | 329 |
| | u | 144 | 134 | 278 | 32 | 50 | 82 | 144 | 136 | 280 |
| | v | 68 | 80 | 148 | 38 | 39 | 77 | 214 | 201 | 415 |
| | w | 129 | 130 | 259 | 42 | 52 | 94 | 149 | 138 | 287 |
| | x | 109 | 105 | 214 | 41 | 39 | 80 | 170 | 176 | 346 |
| | z | 99 | 111 | 210 | 51 | 52 | 103 | 170 | 157 | 327 |
| Totals | | 1,404 | 1,387 | 2,791 | 626 | 651 | 1,277 | 2,130 | 2,122 | 4,252 |
| * | *M* | | | 214.7 | | | 98.2 | | | 327.0 |
| * | σ (dis.) | | | 51.3 | | | 18.9 | | | 55.1 |
| * | σ*M* | | | 15.4 | | | 5.7 | | | 16.6 |
| Seraphed | b | 106 | 124 | 230 | 28 | 22 | 50 | 186 | 174 | 360 |
| | d | 157 | 142 | 299 | 36 | 44 | 80 | 127 | 134 | 261 |
| | f | 148 | 136 | 284 | 46 | 55 | 101 | 126 | 129 | 255 |
| | g | 130 | 122 | 252 | 24 | 33 | 57 | 166 | 165 | 331 |
| | h | 112 | 111 | 223 | 43 | 33 | 76 | 165 | 176 | 341 |
| | i | 162 | 161 | 323 | 65 | 59 | 124 | 93 | 100 | 193 |
| | j | 160 | 159 | 319 | 41 | 23 | 64 | 119 | 138 | 257 |
| | k | 111 | 115 | 226 | 80 | 97 | 177 | 129 | 108 | 237 |
| | l | 153 | 155 | 308 | 46 | 65 | 111 | 121 | 100 | 221 |
| | p | 97 | 92 | 189 | 41 | 51 | 92 | 182 | 177 | 359 |
| | q | 58 | 64 | 122 | 40 | 41 | 81 | 222 | 215 | 437 |
| | t | 130 | 142 | 272 | 46 | 45 | 91 | 144 | 133 | 277 |
| | y | 174 | 173 | 347 | 28 | 37 | 65 | 118 | 110 | 228 |
| Totals | | 1,698 | 1,696 | 3,394 | 564 | 605 | 1,169 | 1,898 | 1,859 | 3,757 |
| * | *M* | | | 261.0 | | | 89.9 | | | 289.0 |
| * | σ (dis.) | | | 46.8 | | | 32.4 | | | 67.7 |
| * | σ*M* | | | 14.1 | | | 9.8 | | | 20.4 |

* When $\sigma M = \frac{\sigma(\text{dis.})}{\sqrt{N-2}}$.

TABLE 12A

*Showing differences and the significances of these differences in legibility between Vertical, Curved-vertical, Diagonal, Curved, Seraphed and Unseraphed letters—Derived from tables 10 and 11*

| | UNSERAPHED | | | | VERTICAL | | | | CURVED-VERTICAL | | | | DIAGONAL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diff. | σdiff. | Diff./σdiff. | Sig. | Diff. | σdiff. | Diff./σdiff. | Sig. | Diff. | σdiff. | Diff./σdiff. | Sig. | Diff. | σdiff. | Diff./σdiff. | Sig. |
| *Correct:* | | | | | | | | | | | | | | | | |
| Seraphed | 46.3 | 20.8 | 2.22 | 99 | | | | | | | | | | | | |
| Curved-Vertical | | | | | 47.5 | 67.8 | 0.70 | 76 | | | | | | | | |
| Diagonal | | | | | 23.5 | 41.1 | 0.57 | 72 | 24.0 | 73.0 | 0.33 | 63 | | | | |
| Curved | | | | | 29.8 | 32.6 | 0.91 | 82 | 17.7 | 68.6 | 0.26 | 60 | 6.3 | 42.3 | 0.15 | 56 |
| *Wrong Position:* | | | | | | | | | | | | | | | | |
| Seraphed | 8.3 | 11.3 | 0.73 | 76 | | | | | | | | | | | | |
| Curved-Vertical | | | | | 26.3 | 19.9 | 1.32 | 90 | | | | | | | | |
| Diagonal | | | | | 2.7 | 22.9 | 0.12 | 55 | 23.6 | 27.8 | 0.85 | 80 | | | | |
| Curved | | | | | 14.2 | 12.8 | 1.11 | 86 | 12.1 | 20.4 | 0.59 | 73 | 11.5 | 23.3 | 0.49 | 69 |
| *Missed:* | | | | | | | | | | | | | | | | |
| Seraphed | 38.0 | 26.3 | 1.44 | 93 | | | | | | | | | | | | |
| Curved-Vertical | | | | | 73.7 | 66.1 | 1.11 | 86 | | | | | | | | |
| Diagonal | | | | | 26.2 | 43.3 | 0.61 | 73 | 47.5 | 72.7 | 0.65 | 74 | | | | |
| Curved | | | | | 44.0 | 33.3 | 1.32 | 90 | 29.7 | 67.2 | 0.44 | 67 | 17.8 | 45.0 | 0.39 | 65 |

Where $\frac{\text{Diff.}}{\sigma\,\text{diff.}} = \frac{M_1 - M_2}{\sqrt{\sigma M_1^2 + \sigma M_2^2}} = \frac{M_1 - M_2}{\sqrt{\frac{\sigma\,(\text{dis.})}{\sqrt{N}} + \frac{\sigma\,(\text{dis.})}{\sqrt{N}}}}$, $N$ being variable, depending on the number of cases: 25, $N = N$; 15+, $N = N - 1$; 8+, $N = N - 2$; 8−, $N = N - 3$. The significances in this table, as in table 12B, have been computed by assuming the $r$ in the above formula to be equal to zero. But as a matter of fact $r$ did not equal zero (see tables 1A and 1B), hence the values of significance should all be greater in these two tables than they now are.

ineffective letters, save the q, have no seraphs whatsoever above or below the main line of print.

Regrouping the letters of table 9 according to their belonging in the vertical, curved-vertical, diagonal, curved, seraphed, and unseraphed families, we obtain tables 10 and 11. The differences between the mean total scores for these families and the sigmas of these differences have been computed and appear in

TABLE 12b

*A rearrangement of the items of table 12a in a descending order*

| | *Significance between* | |
|---|---|---|
| 99 | seraphed—unseraphed | (correct) |
| 93 | seraphed—unseraphed | (missed) |
| 90 | seraphed—vertical | (misplaced) |
| 90 | curved—vertical | (missed) |
| 86 | curved—vertical | (misplaced) |
| 86 | curved-vertical—vertical | (missed) |
| 82 | curved—vertical | (correct) |
| 80 | diagonal—curved-vertical | (misplaced) |
| 76 | seraphed—unseraphed | (misplaced) |
| 76 | curved-vertical—vertical | (correct) |
| 74 | curved-vertical—diagonal | (missed) |
| 73 | curved—curved-vertical | (misplaced) |
| 73 | diagonal—vertical | (missed) |
| 72 | diagonal—vertical | (correct) |
| 69 | diagonal—curved | (misplaced) |
| 67 | curved—curved-vertical | (missed) |
| 65 | curved—diagonal | (missed) |
| 63 | curved-vertical—diagonal | (correct) |
| 60 | curved-vertical—curved | (correct) |
| 56 | diagonal—curved | (correct) |
| 55 | diagonal—vertical | (misplaced) |

table 12a. The largest absolute difference is that obtaining between the means of the vertical and curved-vertical families in terms of totally missed letter scores, amounting to 73.7. If we compute the significance of this difference by computing the probability of its exceeding zero in a larger number of cases, we find this probability to be 86 in 100 chances. Hence, the difference may be regarded as being significant, although its

ratio $\frac{D}{\sigma d}$ is only 37 per cent of that value which would insure[7] without question a difference greater than zero in all cases. However, if we will arrange, in the order of greatest to least, the significances of the differences between letter-groups contained in table 12a, we will obtain the sequence in table 12b.

From table 12b it will be observed that the most significant difference is that obtaining between the seraphed and unseraphed characters, an absolute difference of only 46.3 in total scores for the criterion of correct letters, a difference however so large as to occur in excess of zero, in all probability, 99 times in every one hundred duplications of the experiment. This difference is large enough to possess a ratio $\frac{D}{\sigma d}$ which is 74 per cent of what it should be to guarantee a difference always greater than zero, an amount twice as large as that which characterized the difference between the missed vertical and curved-vertical letters. If one desires to pursue the matter further, one will find, in table 12a, that we have failed to compare the seraphed and unseraphed letters with all other type families; this failure resulted from our realization that the seraphed and unseraphed groups of letters contain the letters of all other groups, so any comparison between them would be useless. The least difference found is that which obtains between the diagonals and the curved letters correct scores (6.3), a difference having a probability of 56 chances in every one hundred of exceeding zero or a probability whose ratio $\frac{D}{\sigma d}$ is only 5 per cent of what would guarantee in every case an excess over zero.

To determine whether the ranges of apprehension for non-specialized groups of letters, as measured in the foregoing pages, have any relationship with proofreading ability, we requested

[7] Since 3 sigmas will always include the total distribution of cases upon either side of the mean, $\frac{D}{\text{sigma } d} = 3$ will give complete reliability. In this instance, $\frac{D}{\text{sigma } d}$ equals 1.11 and this is 37 per cent of 3.

the thirty subjects to read and correct one sheet of proof. The sheet employed was 4 of Series D in Crosland's earlier investigation (28). It was selected because Series D has been found, in subsequent computations, to correlate less highly with the other series (A, B, and C) than they correlate among themselves in the matter of accuracy and because sheet no. 4 of D has been found to correlate highly with both sheets 2 and 5 of the same series, D. Each subject[8] was left totally uninformed beforehand as to what kinds of errors and the number of the same were objectively present in the sheet. He was instructed to read and correct the sheet by merely underscoring each discovered error while aiming all the while at both maximum accuracy and maximum speed. A split-second stop-watch was held by the experimenter who gave a "ready" and a starting signal and who recorded the consumed time in seconds upon the conclusion of the reading. No rereading, during or following the progress down the sheet, was allowed. After the sheet had been proofread by the subject it was scored for all of his errors by comparison with the stencil employed in the earlier investigation. Table 13 contains the records of the inaccuracy and the speed of each subject. Computations were made for Series I for the correlation existing between proofreading efficiency, measured in each of three ways: for accuracy, for speed, and for the product of both of these ($E \times T$), and each of the ranges for correct letters, misplaced letters, and the sum of these two. The coefficients of correlation are contained in table 14.[9] The coefficient between speed of reading proof and

[8] Two of the subjects, nos. 14 and 27, had had prior experience in reading proof. In fact, subject 14, who ranked highest in proofreading efficiency in this test, had constructed and prepared the proof which was used and can be assumed, for that reason, to have had great familiarity with the particular sheet in question. But, in spite of this prior experience and antecedent familiarity, he committed five errors in a possible forty-three.

[9] By Pearson's formula, inferring $r$ from rho. It is also to be noted in table 14 that the scoring is different from that in all other tables, in giving only 1 point for each totally correct letter, although under the caption of "correct" only totally correct letters have been included as was true of the other tables also.

TABLE 13

*Showing number of Correct and Wrong Position letters perceived by each subject in Series I; also Error and Time scores on proofsheets*

| | SUBJECTS | SERIES I | | | PROOFSHEETS | | |
|---|---|---|---|---|---|---|---|
| | | Correct | Wrong position | Sum | Errors | Time | Product $E \times T$ |
| | | | | | | *seconds* | |
| 1 | Hm | 197 | 103 | 300 | 36 | 295 | 10,620 |
| 2 | Mc | 169 | 80 | 249 | 34 | 270 | 9,180 |
| 3 | Py | 169 | 61 | 230 | 33 | 335 | 11,088 |
| 4 | KW | 225 | 65 | 290 | 24 | 220 | 5,280 |
| 5 | HB | 256 | 82 | 338 | 21 | 355 | 7,455 |
| 6 | HO | 257 | 50 | 307 | 16 | 305 | 4,880 |
| 7 | By | 36 | 68 | 104 | 22 | 265 | 8,480 |
| 8 | Wm | 134 | 69 | 203 | 36 | 205 | 7,380 |
| 9 | Cm | 264 | 106 | 370 | 27 | 390 | 10,530 |
| 10 | Tw | 192 | 78 | 270 | 30 | 470 | 14,100 |
| 11 | Sp | 268 | 113 | 381 | 24 | 230 | 5,520 |
| 12 | PW | 231 | 69 | 300 | 35 | 222 | 7,770 |
| 13 | Wy | 132 | 82 | 214 | 21 | 300 | 6,300 |
| 14 | Cr | 199 | 13 | 212 | 5 | 448 | 2,240 |
| 15 | Mk | 159 | 108 | 267 | 25 | 350 | 8,750 |
| 16 | Tr | 171 | 49 | 220 | 30 | 430 | 12,900 |
| 17 | Dr | 261 | 69 | 330 | 19 | 262 | 4,978 |
| 18 | Hz | 165 | 84 | 249 | 27 | 335 | 9,045 |
| 19 | Bs | 214 | 88 | 302 | 23 | 485 | 11,155 |
| 20 | Bg | 216 | 96 | 312 | 28 | 280 | 7,840 |
| 21 | Ta | 126 | 79 | 205 | 26 | 230 | 5,980 |
| 22 | Ko | 225 | 50 | 275 | 18 | 300 | 5,400 |
| 23 | Jo | 179 | 81 | 260 | 26 | 310 | 8,060 |
| 24 | Be | 187 | 52 | 239 | 28 | 355 | 9,940 |
| 25 | Mr | 215 | 83 | 298 | 33 | 210 | 6,930 |
| 26 | Dv | 254 | 94 | 348 | 37 | 180 | 6,660 |
| 27 | Bu | 237 | 97 | 334 | 24 | 330 | 7,920 |
| 28 | Cn | 191 | 45 | 236 | 18 | 317 | 5,706 |
| 29 | Su | 212 | 88 | 300 | 29 | 260 | 7,540 |
| 30 | De | 73 | 81 | 154 | 36 | 310 | 11,160 |

correctly perceiving and reproducing the letters with complete accuracy was negligibly small (plus 0.09). In other words, a subject with a high score of "correct" letters may be either fast or slow in reading proof. This coefficient is vastly smaller

than that obtained by Crosland (28). Also the correlation between the accuracy of reading proof and the greatest accuracy in our experiment is low but positive (0.25). The smallness of these values, we believe, arose from the too great speed with which many of the subjects read their proof and the consequences of hurry upon their accuracy. If this surmise is correct, the product of the time consumed and the accuracy of reading should correlate more highly with the greatest accuracy scores in our experiment. This product, in lieu of any other index which is at present accessible, may conceivably be regarded as the fairest index of proofreading efficiency which we have.

TABLE 14

*Showing correlations* between Correct and Wrong Position letters and Proofreading efficiency as measured by number of Errors, Time in seconds, and the product of these two*

| | CORRECT | | WRONG POSITION | | SUM—CORRECT AND WRONG POSITION | |
|---|---|---|---|---|---|---|
| | r | P.E. | r | P.E. | r | P.E. |
| Errors in proof | 0.25 | 0.121 | −0.29 | 0.118 | 0.078 | 0.128 |
| Time | 0.094 | 0.128 | 0.115 | 0.127 | 0.09 | 0.1279 |
| Product $E \times T$ | 0.845 | 0.037 | −0.25 | 0.121 | 0.177 | 0.125 |

* Correlations "+" unless otherwise marked; all P.E.$_{r's}$ are "±."

It turns out that such an index correlates very highly and positively with our scores of greatest accuracy, the value being as high as plus 0.845. We regard this result to be a most surprising as well as useful one, the most useful one in the entire experiment in so far as tests of proofreading efficiency are concerned. From another practical point of view, namely from the point of view of printers, manufacturers of printing types, and designers of type-writer characters, the fact that seraphed letters are more effective in producing accurate perception than are unseraphed characters may be the most useful result in the entire investigation. A subject cannot be both slow and inaccurate in reading proof and do well in our experiment and *vice versa*. He may be the most accurate or the most

speedy, with respective and commensurate compensations in the other base of his proofreading efficiency—he need not be both the swiftest and the most accurate in order to rank very high in efficiency in our experiment.

If we continue our comparisons of proofreading efficiency with the efficiencies of attention ranges in the various letter-groups of 3's, 4's, 5's, and so on, in table 15, we will discover no signifi-

TABLE 15

*Showing correlations* between proofreading efficiency as measured by $E \times T$ score, and score on the several letter groups (correct and misplaced letters combined)*

| | LETTERS PER CARD | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3's | | 4's | | 5's | | 6's | | 7's | | 8's | | 9's | | 10's | |
| | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. | $r$ | P.E. |
| Proof: $E \times T$. | 0.14 | 0.126 | 0.34 | 0.11 | 0.38 | 0.109 | 0.30 | 0.117 | 0.24 | 0.12 | 0.18 | 0.124 | 0.216 | 0.12 | 0.06 | 0.128 |

* Correlations "+" unless otherwise marked; all P.E.$_{r's}$ are "±."

TABLE 16

*Showing correlations* between Proofreading efficiency as measured by $E \times T$ score, and the number of Correct letters perceived in the several letter groups*

| | LETTERS PER CARD | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3's | 4's | 5's | 6's | 7's | 8's | 9's | 10's |
| Proof: $E \times T$... | 0.19 | 0.41 | 0.42 | 0.29 | 0.48 | 0.34 | 0.24 | 0.28 |

* Correlations "+" unless otherwise marked.

cantly large coefficients of correlation. All of the coefficients, however, are positive. It is to be noted that in table 15 we have employed a combination of correct and misplaced letters as one of the bases of the computations. Where, in table 16 we retain our older scheme of dealing with merely the letters wholly correct, and ignoring the misplaced characters, and where we correlate such values with proofreading efficiencies, the values turn out to be somewhat higher (than in table 15) but

still so small as to be almost negligible. In both tables, nos. 15 and 16, there is a suggestion of the fact that persons with efficient ranges for four or five characters are likely to be persons who are efficient in reading proof.

## DISCUSSION AND HISTORICAL NOTE

Experiments to determine the "range of attention" were among the earliest performed under Wundt's direction at Leipzig. It has been an engaging field of study in many laboratories of psychology. Range has been measured and the measurements checked with varying types of stimuli, varying methods and temporal intervals of exposure, with, naturally, varying results and not a little controversy. The most recent developments in the field have consisted of the use of pursuit-meters and the employment of "complication" techniques, in efforts to discover to what lengths subjects can go in performing simultaneous tasks or near-simultaneous tasks under conditions of stress, oxygen-deprivation, fatigue, giddiness, etc.

The most recent controversy has engaged itself with Oberly's (27, 29) attempt to distinguish between attention, cognition, and apprehension. Dallenbach (28a) claims that Oberly's limens for cognition and apprehension "give us merely the ranges of the confident, correct cognitions that are immediate and ungrouped, immediate and grouped, and mediated and counted."

Gill and Dallenbach (30) assert that current text-book statement that "the grasp of visual attention covers from four to six simultaneously presented objects" refers to apprehension, not to attention. They themselves found the individual limens of range of attention to vary from 17 to 42 stimulus objects.

It was not the object of our experiment to further define these terms or to determine the limens of either attention or apprehension or otherwise to engage in the controversy. The term "apprehension" employed in this paper we have made cover all three of the categories distinguished by Oberly.

The length of the exposure employed will depend upon the function or ability a given experiment is proposed to test, and

not a little upon the type of exposure apparatus, method and degree of illumination, and timing device. For example, Whipple (19), with his tachistoscope, has found that an exposure of 50 to 75 sigma will give a well-defined imgage when the pre- and post-exposure fields, are dark but, that, with white pre- and post-exposure fields in his early experiment upon the range of attention, 100 sigmas were required. Exposure-times as short as 10 sigma have been used, such as by Cattell (1, 2) in his first experiments to measure the "span of consciousness," while Quantz (see review in Crosland's monograph (28)) employed exposure periods of 500 sigmas or more in tests of reading.

Our experiment was planned to employ a constant time of exposure just short enough to prevent eye-movement during one fixation. Huey (reference 60 in (28)) had found the average reading-pause to vary from 200 to 330 sigmas in duration; Dearborn (10) had found it to range from 160.8 to 401.9 sigmas; and Dodge (8) had found it to be more than 200 sigmas. Therefore, since we planned to employ white pre- and post-exposure fields, we thought it advisable to employ an exposure-time of approximately 150 sigmas; this interval is in excess over Whipple's time-interval for range of attention and just under the minimal periods for reading-pauses of Huey, Dearborn, and Dodge.

Practice-effects, in experiments of this sort, have been frequently reported, but no statistical records or graphic representations of these effects have we been able to find in the literature. Cattell and Hylan (9) believed that practice had very little effect after "the preliminary habituation to arrangement, and method had passed." Foster (14) discovered that practice gains are greater in the earlier part of such an experiment than in the latter part. Whipple also states (13) that practice is negligible "when adaptation and assimilative devices are eliminated." From our own results we are inclined to regard Whipple's rather all-inclusive statement to be essentially true. The effects of practice had not, in our investigation, ceased throughout the entire course of ten half-hour sessions for

each subject distributed throughout two school terms; such a continuation of the experiment would scarcely be called "preliminary" in the sense in which Cattell and Hylan have used the term; moreover, during each session, it will be remembered, four blank exposures were presented prior to the main cards and each denomination of number of letters during the experiment proper occurred in five samples instead of one.

There are many factors which affect legibility. Cattell (2) who made some of the earliest investigations discovered only negligible differences in the amount of time which was required for the recognition of isolated letters but was able, by keeping the time of exposure constant, to arrange an order of the legibility of the lower-case letters. Sanford (4) also has arranged the letters in an order of legibility but, unfortunately, an order different from Cattell's; he had used Cattell's method but with a different font of type.

Griffing and Franz (5a) have studied the effect of size, and of form, of type, employing several fonts, and have discovered the larger types to be the more legible.

Roethlein (15) investigated the legibility of different faces of printed type. She found that the size of the letter, and the breadth of lines of which it is composed, are the chief determinants of its legibility. Since breadth of line determines the amount of the contrasting white space which will appear within the letter itself, it is supposed that some definite proportion or ratio of the two will assure maximum legibility. There is, therefore, every reason to suppose that the third factor, of the spacing outside but surrounding the letter, influences the other two factors.

Baird (21) approached a part of the problem in his study of the legibility of the New York City telephone directory, in which investigation he discovered that the insertion of a 1-point lead between lines increased the legibility.

Bentley (25a) also investigated the problem of the influence of leading upon legibility. Using 6-point, 9-point, and 12-point "Monotype" type, he found a steady reduction in the time required for reading in each as the leading increased from 0 to

3-point leads; practically no increased speed resulted from leads whose thicknesses varied from 3 to 6-points; speed increased, unaccountably, in all cases with 7-point leading, and again declined with 9-point leads. Such results led him to propose that the effective desideratum is the ratio of letter-height to interlinear spacing, since with 7-point leads and 12-point type a ratio, H/S of 1.7, gave the highest efficiency. If it is true that interlinear spacing, within certain limits, affects legibility, no doubt inter-letter spacing is also significant. However, our left-to-right method of printing and reading may militate against the degree of this significance. While, in our experiment, the difference between the spaced and unspaced records amounted to only 0.845 per cent for all series taken together, still this fact and the further facts of larger effects in several individual series do suggest the possibility of measurable effects of inter-letter spacing. It should be possible in a further experiment to arrange several comparable series containing all letters of the alphabet arranged in chance orders with the only variable being the inter-letter space factor; if this spacing were then gradually increased by hair-amounts until it approached the width of the widest letter, the exact relation which exists between the space within the letter and the space without, and letter-line breadth, could be determined so that maximum legibility could be predicted.

Messmer (Crosland's monograph (28)) speaks of "dominant" letters in the perception characteristic of reading, and names the three factors of height, breadth, and shape as being the determiners of the legibility of a letter.

Javal (3) had thought that width alone is the most important determinant but Roethlein's (15) experiment indicates other factors of equal importance. She lists six: form and size of letter; heaviness of face; the width of the white margin which surrounds the letter; position of the letter within its letter-group; and the size and shape of the letters which surround it immediately on either side. Her data, however, were not arranged in such a fashion that the indivdual letters of the same type face could be compared. If this is done, as is described in

the present experiment, the factor of inter-letter hair-spacing is found to be so small as to be almost negligible. That the differences between letters grouped according to shape is not, in many cases, significantly large may be due, not to lack of real shape differences, but to an artificial grouping taken over arbitrarily from Messmer's classification and to the lack of a double-fatigue order of presentation in our experiment.

Hamilton (12) had discovered that, due to the frequent occurrence of certain letters in ordinary reading, they are more readily recognized than others. On the other hand, both Messmer and Zeitler (28) have argued the other way around with respect to the "dominance" of the diagonal letters. Hamilton, however, believed that letters which in isolation are "dominant" may lose this "dominance" when they are combined with other but non-dominant letters. In our investigation the "dominants" i and y were found to be among the five most legible characters, and the unseraphed letters were found to be less legible than the seraphed characters.

Messmer believed that he had discovered two types of readers whom he called the subjective and the objective, the first type reading by large word-wholes and the second type possessing a small range directed squarely at the point of fixation. His subjective type corresponds with our "broad-accurate" type and his objective type approximates our "scattered-thin" type.

Dodge (8) maintains that, no matter how short the exposure period may be, there will often occur a condition of a "roving attention" which is not effected by a succession of fixations but is a phenomenon of successions of clearnesses from left to right. The eye itself does not move; dominance occurs merely in a left to right succession. A similar situation was noted by our own subjects in the continuation of their perception just after the exposure had ended when they were beginning to reproduce the characters. This succession, however, appeared to be more in terms of imagery, during the recall proper, than in terms of the clearness of the enduring perception. From the comments which were volunteered by a number of intro-

spectively inclined subjects, we deduced that there are three levels of clarity and certainty: the first few letters were recalled in visual terms and were accompanied by certainty; the next few (of the same card) were recalled in vocal-motor terms with less certainty; and often the last letter or two was merely added or "tacked" on, the hand having written in automatic fashion without any awareness on the subject's part of ever having seen the recorded character or characters during the exposure. These three levels did not occur together in every perception and perceptuo-recall. Any one, or any two, or all of them occurred at various places in the experiment. They themselves are not greatly dissimilar to Oberly's three categories of attention, cognition, and apprehension.

## SUMMARY AND CONCLUSIONS

1. A ½-point inter-letter spacing in 10-point lower-case Caslon body type does not very appreciably affect the legibility of the letters. In the experiment as a whole the spacing increased legibility by only 0.845 per cent.

2. In letters whose shapes do not contrast greatly, such as p, d, b, and q, the effect of the hair-spacing is greater, amounting in Series VI to 4.05 per cent.

3. Small, almost negligible, differences in legibility occur between vertical, curved-vertical, diagonal, and curved letters. The largest difference exists between the vertical and curved-vertical letters, when only the letters missed are considered, a difference whose probability of exceeding zero is 86 in 100 chances and whose ratio of $D$/sigma $d$ is 37 per cent of what it should be to guarantee a difference greater than zero in every case.

4. Seraphed letters are more legible than unseraphed letters; the difference in legibility between them, in scores for correct letters, is as significant as is shown by a probability of 99 cases in 100 of exceeding zero and by a ratio of $D$/sigma $d$ of 78 per cent of what would insure absolute reliability.

5. Proofreading efficiency, as measured by a combined score

(product) of speed and accuracy, correlates as highly and positively with "correct" letter scores as 0.845.

6. Learning appears and continues throughout the experiment to a marked degree. Failure to secure a double-fatigue order of the presentation of the various series probably accounts for its presence or, at all events, its not having been diminished by cancellation when the spaced and unspaced records were thrown together. Conclusion 3 above must be accepted in the light of this fact.

7. Individuals differ in their methods of attending to and their abilities to perceive the letters of the alphabet. Three types of subject were indicated: those persons who consistently perceived (recalled) the first three or four letters accurately regardless of the large number of letters on the card, those whose range increased as the number of letters on the card increased, and those whose range became small because it was "thinly scattered" over the various characters during an exposure.

8. The reliabilities of the experiment were shown to be high by Pearson's rank-differences formula applied to the first and second presentations (A and B) and to interrelations between the seven series. The high values of these coefficients suggest that the same abilities were being tested throughout.

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# AFFECTIVE REACTIONS TO PAINTING REPRODUCTIONS

## A Study in the Psychology of Esthetics[1]

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There is a notion abroad that feelings caused or induced by paintings are a private affair. Everyone is said to react differently and a comparison of the affective reactions to paintings is said to be impossible. This notion would a priori preclude any attempts to compare or measure emotions in art. It is interesting to note, on the other hand, that the Synchromists advocate the development of the art of painting as one of form and color whereby to excite the emotions. They aim to develop an art of color as a psychological means for rich emotional experiences. The question of the importance of emotions in art is furthermore probably interrelated with the attempts to devise a test for esthetic appreciation. Whether or not emotional reactions to paintings are purely heterogeneous and beyond the methods of comparison can be put to the test. The experiments to be reported here were attempts to compare emotional reactions of individuals to painting reproductions in colors.

First there was a series of preliminary experiments for empirically determining the expedient means for comparing emotional reactions. Most of the pictures included later on in the

[1] This study was undertaken as an M.A. thesis at Columbia University under Professor A. T. Poffenberger, to whom the writer wishes to express his gratitude for his constant guidance and kind encouragement. He is also indebted to those educators who obligingly allowed the tests to be made in their schools, and to Professor R. Pintner, Teachers College, Columbia University, for his suggestions.

test-proper were used. Eleven subjects were given the "free-emotional reaction experiment." In this group there was a college freshman, two juniors and two seniors, three graduate students, a first year law student, and two college graduates. One minute was allowed on each picture. The only instructions were to make note of any emotional reactions, of any emotions at all aroused by the pictures. The results of this experiment show striking similarity to those found in the "controlled" emotional reaction experiment. It will be noted from the account of the results that in addition to using terms describing emotions, many of the subjects were identifying those experiences with the picture situation. The results included here give an outline of the emotional reactions of the eleven subjects to the pictures they were presented with. The numbering of the pictures in this resumé corresponds with that used in the account of the experiment-proper.

COMBINED RESULTS OF THE FREE-EMOTIONAL REACTION EXPERIMENT

*Picture 1:* Amazement; hazy, does not seem to mean anything, devastation; no emotions, warmth, drowsy, reminds me of the summers I spent as a youngster—always day dreaming; also of a trip—I held a broken axle in a Ford—up; friendliness, destitute and barrenness.

*Picture 2:* Internal confusion; confusion; "what is this feeling;" perplexed; aloneness, sort of uneasiness; apathy; what's this, looks like a book stuck upon end—can't make it out; meaningless.

*Picture 3:* Sympathy; love of life; local color; calmness, simplicity; pure pleasure, playfulness, restfulness; very cute—I feel like speaking to them and playing with them—it seems so realistic.

*Picture 4:* It gives me a lazy feeling—I feel like going to sleep; summer time; pessimisms and wonder, desire for lack of education; overpoweringness.

*Picture 5:* Can hear the birds; delight, joy, song, poetic feeling, harmony with nature, calmness, little reaction, lonesome feeling, quiet, fear, calm beautiful—I'm sure it's fragrant; violets—they're pretty—nice walk at this time or a bit later; cool, calm, tranquillity.

*Picture 6:* Ecstasy, a surging of emotions, dreamy sentiments, distorted and disturbed pleasantness clashing against unpleasantness; delight—tennis, a swim, color, joy, exquisiteness, turmoil, a thrill; apathy; almost too bright to seem natural and yet evokes feeling as if I had actually seen the scene before me.

*Picture 8:* Pleasure of sea very faint; desire to hunt ducks, memories of sea side; dreariness, no feeling, cool—sing or shout to express something I feel deeply; solitude, erotic, freedom.

*Picture 10:* Desire for a sea voyage or to revert to the boyish pleasures and carefree life of fishing and enjoying bathing; inspiring a spirit of adventure; where I'd like to be, it makes me feel lonesome and wish I could be with them.

*Picture 12:* Reminds me of Victoria, in the Japanese Gardens looking across the bay to Seattle—I liked it, I love water; joy, beauty, pleasantness, warmth; no evident emotion; dawn; uplifting, exhilaration, imagination, longing for travel to view pictured scene—that's of bright, warm summer day with congenial companionship; romance, inspiring platonic love; exhilaration, wanderlust.

*Picture 13:* Surprise, effect of evening moonlight on the water, chilliness; night, black depths, aloneness, solitariness, almost dismal, spooker, romantic sea voyage; chill of cold breezes and heaving waves.

*Picture 14:* Sense of romance; love, desire for companionship, dream castles, rest; coolness; no reaction; tranquil scene inducing sleepy feeling; sort of happy but rather crude response.

*Picture 15:* Pleasure of field; joyous feeling, spring crops, farm life, joy, growth, reminds me of a farm I visited; absolute peace; placid quiet and contentment; quiet, restful, calm, with mingled feeling of depression; happy, gay.

*Picture 16:* Harmony of details and general effect; it's going to storm—better look for shelter; wonder—almost fear; quiet feeling as if something was impending; calm, gentle, quiet, tranquillity.

*Picture 17:* Sprightly feeling, fresh and expansive, peace and serenity; glory and grandeur; exalted feeling of wonder and awe at something great and beautiful; no evident emotion.

*Picture 18:* Creates feeling of uneasiness; negative reaction, disapproval; annoyance at modern attempt at emotional painting; looks like a futurist picture of Old Japan and very futurist too; what a ghastly sun.

*Picture 19:* Peacefulness, quiet, just loveliness personified, perfectly balanced poise; sadness, spooning sensation.

*Picture 20:* Warm colors, no fear; vivacious reaction, stirring, boiling; reminds me of my thoughts of creation; a sort of becoming; beauty of color, warmth, undiscernible emotion; intense heat; wonder.

A list of emotion-adjectives was drawn up from these reactions. Changes were made; the list follows in a way several theories of emotions. That is why "fatigue" was included. The principal emotions of the manic-depressive psychoses,

where there is but an exaggeration of the affectivity of everyday life, are excitement, depression, and apathy. This fact also served as a guide. When the list was put into shape, there was a controlled emotional reaction test given to 6 subjects; they had a minute for each picture and were instructed to note down the number or numbers of the adjective or adjectives in the list which indicates the way each picture made them feel. In this test the individuals were two high-school freshmen, two high-school sophomores (girls); a college freshman, and a senior. They also were asked to note down any adjective not included in the list. The consensus of opinion of those tested was that the list was complete. Two suggested that the adjective "beauty" be added. This suggestion was not followed, as the emotions aroused in the sentiment of beauty are too complex. By this method, the list of adjectives used in the experiment-proper was empirically constructed.

### THE EXPERIMENT: PROCEDURE

There were twenty painting-reproductions in colors. They were (as numbered in the data of the preliminary experiment and the experiment-proper):

1. After a Summer Shower—George Inness
2. Hastings, about 1835—Turner
3. Children of the Sea—Israels
4. Autumn Oaks—George Inness
5. Shipton, Kew Gardens—Flora Pilkington
6. At Shipton Court, Oxon—Flora Pilkington
7. Clouds and Shadows—Van Heir
8. Northern Sunrise—Bruno A. Liljeforss
9. Havelbucht bei Potsdam, Privatbesitz—Ulrich Hubner
10. Monte Pelligrino, Palermo—Collins
11. Picturesque Cairo—V. S. Vassiliou
12. Lago Maggiore—Petrie
13. Moonlight, Wood's Island Light—Winslow Homer
14. The Backs, Cambridge—Graham Petrie
15. Buttercup Meadow—Francis Drummond
16. The Mill—Ruysdael
17. Awakening Day—Marius Forestier
18. Balkanlandschaft—Franz Heckendorf

19. A View of the Seine—Homer Martin
20. Cotopaxi, Ecuador—F. E. Church

The sample-picture: Sundown—Marius Forestier.

The reproductions were mounted on white cardboards, with all literary-notes cut off. Thus the subjects could not tell the title or the painter from the test-picture.

The experimenter had two identical sets of twenty pictures so that he could test a group of as many as 40 individuals at one time. The procedure except in certain points was standardized. There were twenty pictures and forty-five seconds was allowed on each one. The time was always kept constant.

The experimenter announced that he had an experiment in art-appreciation. The subjects were then numbered in a convenient manner to facilitate the passing of pictures at the end of each forty-five-second interval. There was a sample picture passed around so that the gist of the experiment could be understood. The only important instructions given were repeated from the test-sheet: "Opposite each picture number below write the number (or numbers) of the adjective (or adjectives) corresponding to the way each picture makes you feel. For example, the sample picture may suggest *awe* and *wonder* and would be marked 15 and 10." The subjects were told that on the list the picture-numbers refer to the number on the back of the picture. Forty-five seconds was allowed for each picture, so that a complete group could be tested within twenty minutes.

The test-sheet contains the list of adjectives, brief instructions, and a series of picture numbers.

### The Test-Paper

*First—Look over this list:*

1. calmness, peace, serenity
2. depression, gloom, sadness, dejection, melancholy
3. solitude
4. fatigue
5. excitement, anxiety, restlessness, worry
6. frenzy
7. tumult, turmoil, agitation, hubbub, confusion
8. surprise

9. wanderlust, adventurous, yearning
10. wonder, curiosity
11. delight, happiness, gladness, joy, pleasant
12. exaltation, exhilaration, ecstasy
13. sprightly, vivacious, cheerful
14. romantic
15. awe, sublimity, majestic, reverence
16. apathy, laziness, stupor
17. sympathy
18. unpleasantness
19. love
20. fear
21. anger
22. hate
23. admiration

Opposite each picture number below write the number (or numbers) of the adjective (or adjectives) corresponding to the way each picture makes you feel. For exampe, the sample picture may suggest *awe* and *wonder* and would be marked 15 and 10.

*Picture number*

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....
11. .....
12. .....
13. .....
14. .....
15. .....
16. .....
17. .....
18. .....
19. .....
20. .....

School designation.....

### THE GROUPS EXPERIMENTED WITH

There were sixteen groups of subjects: four groups at Teachers College, two at C. C. N. Y., three at Barnard, one at Hunter College, one at Columbia, four at Townsend Harris Hall, and one at the Julia Richman High School. T. C.-A: 19 subjects, all but one being women, a class in art-lettering; T. C.-B: 22 subjects, all women, a very mixed group, studying interior-decoration; T. C.-C: 20 subjects, all women, advanced class in painting; T. C-D: 19 subjects, all but one of whom were women, course in methods of teaching art. The average age of these individuals, roughly estimating, being between 23 and 25. C. C. N. Y.-A, 17 subjects and C. C. N. Y.-B, 19 subjects were studying general psychology, and consisted of juniors and seniors, all men. The average age of the 27 Hunter College women was twenty years, all seniors taking advanced psychology. Barnard-A, Barnard-B, and Barnard-C, were, freshmen in classes in general psychology; consisting of 31, 34, and 26 subjects respectively. At Columbia College a class of 20 subjects, seniors and juniors, average age about twenty years, a class in psychology was tested. The C. C. N. Y. high school Townsend Harris Hall, contributed four groups of 116 high school boys all pursuing courses in art, mechanical drawing or freehand drawing. At Julia Richman High School, a class in art of 30 girls was tested. All in all, 400 subjects were used. The average age of the high school boys was between 12–14 years, and that of the girls, 13 years. There were altogether 226 women and 174 men.

### THE RESULTS

It will be recalled that the subjects were instructed to "write the number (or numbers) of the adjective (or adjectives)." In other words, the greatest freedom within the limits of the twenty-three adjective series was allowed for the emotional expressions of the subjects' reactions. This list allows for variegated emotional reaction descriptions. In but a few instances, the adjective-series are different from one another.

TABLE 1

*The combined average per cent agreements of the 400 subjects for all pictures and adjectives*

| ADJECTIVES | PICTURES | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 1 | 47.4 | 11.5 | 15.7 | 68.8 | 43.3 | 31.0 | 10.0 | 23.0 | 12.7 | 16.6 | 36.3 | 36.2 | 18.9 | 30.7 | 34.2 | 46.8 | 36.6 | 7.0 | 55.2 | 10.0 |
| 2 | 7.7 | 16.1 | 1.0 | 6.2 | 8.2 | 1.6 | 11.1 | 5.3 | 1.8 | 0.8 | 7.1 | 2.7 | 15.5 | 2.1 | 0.8 | 10.7 | 6.5 | 2.4 | 7.8 | 5.7 |
| 3 | 23.6 | 21.2 | 4.2 | 13.1 | 23.3 | 10.2 | 6.5 | 30.5 | 1.9 | 2.6 | 10.6 | 9.4 | 29.9 | 5.2 | 6.7 | 9.5 | 14.7 | 4.6 | 19.3 | 11.5 |
| 4 | 2.7 | 1.8 | 2.6 | 7.2 | 1.1 | 0.2 | 4.8 | 2.6 | 3.0 | 2.0 | 7.9 | 1.2 | 1.3 | 0.2 | 1.1 | 0.5 | 1.3 | 1.1 | 0.7 | 0.8 |
| 5 | 1.9 | 11.7 | 3.1 | 1.3 | 1.0 | 0.8 | 16.9 | 4.0 | 10.4 | 7.9 | 1.4 | 0.7 | 8.6 | 1.5 | 2.4 | 2.8 | 3.0 | 16.9 | 1.6 | 10.1 |
| 6 | 0.6 | 5.3 | | 0.6 | 0.4 | 0.2 | 8.0 | 1.0 | 3.9 | | 3.4 | 1.2 | 4.4 | | 0.4 | 0.3 | 0.8 | 9.6 | 1.2 | 4.2 |
| 7 | 5.9 | 16.3 | 0.6 | 0.9 | 1.0 | 1.2 | 20.0 | 2.9 | 21.4 | 8.1 | 0.3 | 0.8 | 8.7 | 3.3 | 1.7 | 3.9 | 0.9 | 26.6 | 1.1 | 13.3 |
| 8 | 1.8 | 5.5 | 1.8 | 0.3 | 2.9 | 2.4 | 7.7 | 5.9 | 10.3 | 3.3 | 1.6 | 2.4 | 1.5 | 3.3 | 2.3 | 1.2 | 0.6 | 11.3 | 19.0 | 3.2 |
| 9 | 3.3 | 14.3 | 9.8 | 7.1 | 7.4 | 2.4 | 12.3 | 8.7 | 10.8 | 44.8 | 29.1 | 20.1 | 33.8 | 11.9 | 2.4 | 10.9 | 11.6 | 8.9 | 6.7 | 7.1 |
| 10 | 4.3 | 17.2 | 8.8 | 3.2 | 4.7 | 1.4 | 19.3 | 33.7 | 12.8 | 7.7 | 17.6 | 10.1 | 11.3 | 8.7 | 2.2 | 7.1 | 9.8 | 20.3 | 4.9 | 17.2 |
| 11 | 16.9 | 1.8 | 54.0 | 25.0 | 28.3 | 51.8 | 7.1 | 11.2 | 13.6 | 25.5 | 7.9 | 24.1 | 2.4 | 31.8 | 44.9 | 9.1 | 18.9 | 3.9 | 17.9 | 2.1 |
| 12 | 4.9 | 2.1 | 2.9 | 2.6 | 5.3 | 7.8 | 2.3 | 4.5 | 2.6 | 12.1 | 2.0 | 7.9 | 5.4 | 5.3 | 7.2 | 2.1 | 7.4 | 5.3 | 4.2 | 5.8 |
| 13 | 5.5 | 1.7 | 23.6 | 3.8 | 8.2 | 27.1 | 2.0 | 3.9 | 14.7 | 18.8 | 2.3 | 8.8 | 3.7 | 9.1 | 25.4 | 2.4 | 5.8 | 7.2 | 6.2 | 3.3 |
| 14 | 8.3 | 3.7 | 2.3 | 9.8 | 24.0 | 25.9 | 6.0 | 7.3 | 8.0 | 11.1 | 11.5 | 17.9 | 11.0 | 42.6 | 10.5 | 6.7 | 35.6 | 2.6 | 5.5 | 10.3 |
| 15 | 8.9 | 8.1 | 2.0 | 9.0 | 11.8 | 5.6 | 5.5 | 16.0 | 3.2 | 4.1 | 7.1 | 13.3 | 22.3 | 6.9 | 4.5 | 8.3 | 17.1 | 10.0 | 18.4 | 37.2 |
| 16 | 5.1 | 3.0 | 1.4 | 17.6 | 2.2 | 0.7 | 4.3 | 3.7 | 5.1 | 2.9 | 15.4 | 7.7 | 1.8 | 13.5 | 7.1 | 6.8 | 1.3 | 2.7 | 7.1 | 3.4 |
| 17 | 1.9 | 0.9 | 11.1 | 2.8 | 3.1 | 1.4 | 0.7 | 1.8 | 0.6 | 1.1 | 2.9 | 0.6 | 0.4 | 0.8 | 4.2 | 2.8 | 1.7 | 3.0 | 0.9 | 0.4 |
| 18 | 4.8 | 9.7 | 2.8 | 0.2 | 2.7 | 1.7 | 12.3 | 6.7 | 10.6 | 1.8 | 1.5 | 5.1 | 2.9 | 0.7 | 3.2 | 1.7 | 1.9 | 16.6 | 2.8 | 8.5 |
| 19 | 0.8 | 0.7 | 10.2 | 2.4 | 4.6 | 13.0 | 2.2 | 3.3 | 4.7 | 0.4 | 1.5 | 1.5 | 1.0 | 6.0 | 4.5 | 1.8 | 4.7 | 0.9 | 2.7 | 2.5 |
| 20 | 0.4 | 4.0 | 1.2 | 0.9 | 0.9 | 0.2 | 4.6 | 1.2 | 0.8 | 0.9 | 0.9 | 0.9 | 4.8 | 0.4 | | 0.6 | 0.7 | 0.9 | 0.2 | 7.9 |
| 21 | 0.5 | 0.5 | 0.1 | 0.1 | 0.1 | | 1.5 | | 0.8 | 0.2 | | | | 1.6 | 0.2 | 0.2 | 0.2 | | 3.1 | 2.8 |
| 22 | 0.6 | | | 0.2 | | | 0.7 | | 0.9 | | | 0.4 | 0.2 | | | 0.2 | | 1.1 | 0.4 | 2.5 |
| 23 | 3.1 | 0.5 | 3.4 | 6.3 | 10.8 | 17.0 | 3.3 | 7.8 | 2.0 | 4.7 | 5.7 | 7.1 | 6.8 | 5.3 | 6.0 | 12.2 | 16.5 | 11.2 | 10.8 | 7.4 |

TABLE 2

*Characteristic emotional reactions to the pictures*

| PICTURE | ADJECTIVE SERIES | AVERAGE PER CENT AGREEMENT (P.A.) | PICTURE | ADJECTIVE SERIES | AVERAGE PER CENT AGREEMENT (P.A.) |
|---|---|---|---|---|---|
| 1 | (1) calmness | 47.5 | 7 | (7) tumult | 20.0 |
| | (3) solitude | 23.6 | | (10) wonder | 19.3 |
| | (4) delight | 16.9 | | (5) excitement | 16.9 |
| | | | | (9) wanderlust | 12.3 |
| 2 | (3) solitude | 21.1 | | (18) unpleasantness | 12.3 |
| | (10) wonder | 17.2 | | (2) depression | 11.1 |
| | (7) tumult | 16.3 | | (1) calmness | 10.0 |
| | (2) depression | 16.1 | | | |
| | (9) wanderlust | 14.3 | 8 | (10) wonder | 33.7 |
| | (5) excitement | 11.7 | | (3) solitude | 30.5 |
| | (1) calmness | 11.5 | | (1) calmness | 23.0 |
| | | | | (15) awe | 16.0 |
| 3 | (11) delight | 54.0 | | (11) delight | 11.2 |
| | (13) sprightly | 23.6 | | | |
| | (1) calmness | 15.7 | 9 | (7) tumult | 21.4 |
| | | | | (13) sprightly | 14.7 |
| 4 | (1) calmness | 68.1 | | (1) calmness | 12.7 |
| | (3) solitude | 18.1 | | (10) wonder | 12.8 |
| | (11) delight | 25.0 | | (9) wanderlust | 10.8 |
| | (3) solitude | 13.1 | | (18) unpleasantness | 10.6 |
| | | | | (5) excitement | 10.4 |
| 5 | (1) calmness | 43.3 | | (8) surprise | 10.3 |
| | (11) delight | 28.3 | | | |
| | (14) romantic | 24.0 | 10 | (9) wanderlust | 44.2 |
| | (3) solitude | 23.3 | | (11) delight | 25.5 |
| | (15) awe | 11.8 | | (13) sprightly | 18.8 |
| | (23) admiration | 10.8 | | (1) calmness | 16.6 |
| | | | | (12) exaltation | 12.1 |
| 6 | (11) delight | 51.8 | | (14) romantic | 11.1 |
| | (1) calmness | 31.0 | | | |
| | (13) sprightly | 27.1 | 11 | (1) calmness | 36.2 |
| | (14) romantic | 25.9 | | (9) wanderlust | 29.1 |
| | (23) admiration | 17.0 | | (10) wonder | 17.6 |
| | (19) love | 13.0 | | (16) apathy | 15.4 |
| | (3) solitude | 10.2 | | (14) romantic | 11.5 |
| | | | | (3) solitude | 10.6 |

TABLE 2—*Continued*

| PICTURE | ADJECTIVE SERIES | AVERAGE PER CENT AGREEMENT (P.A.) | PICTURE | ADJECTIVE SERIES | AVERAGE PER CENT AGREEMENT (P.A.) |
|---|---|---|---|---|---|
| 12 | (1) calmness | 36.2 | 17 | (1) calmness | 36.6 |
| | (11) delight | 24.1 | | (14) romantic | 35.6 |
| | (9) wanderlust | 20.1 | | (11) delight | 18.9 |
| | (14) romantic | 17.9 | | (15) awe | 17.1 |
| | (15) awe | 13.3 | | (23) admiration | 16.5 |
| | (10) wonder | 10.1 | | (3) solitude | 14.7 |
| 13 | (9) wanderlust | 33.8 | 18 | (17) sympathy | 33.0 |
| | (3) solitude | 29.9 | | (7) tumult | 26.6 |
| | (15) awe | 22.3 | | (10) wonder | 20.3 |
| | (2) depression | 15.5 | | (5) excitement | 16.9 |
| | (1) calmness | 18.9 | | (18) unpleasantness | 16.6 |
| | (14) romantic | 11.0 | | (8) surprise | 11.3 |
| | | | | (23) admiration | 11.2 |
| 14 | (14) romantic | 42.6 | | | |
| | (11) delight | 31.8 | 19 | (1) calmness | 55.2 |
| | (1) calmness | 30.7 | | (13) solitude | 19.3 |
| | (16) apathy | 13.5 | | (15) awe | 18.4 |
| | (9) wanderlust | 11.9 | | (11) delight | 17.9 |
| | | | | (23) admiration | 10.8 |
| 15 | (11) delight | 44.9 | | | |
| | (1) calmness | 34.2 | 20 | (15) awe | 37.2 |
| | (13) sprightly | 25.4 | | (10) wonder | 17.2 |
| | (14) romantic | 10.5 | | (7) tumult | 13.3 |
| | | | | (3) solitude | 11.5 |
| 16 | (1) calmness | 46.8 | | (14) romantic | 10.3 |
| | (23) admiration | 12.2 | | (5) excitement | 10.1 |
| | (9) wanderlust | 10.9 | | (1) calmness | 10.0 |
| | (2) depression | 10.7 | | | |

In some cases there are simple emotions, in others, there are emotion-combinations as in "romantic." Theoretically, each subject could have answered a maximum of twenty-three adjectives for each picture. What actually happened was that the 400 subjects very critically distributed their adjectives. The results presented here are combined group scores. Indi-

vidual and group differences will not be treated here as there are too many problems attached to and involved in a consideration of such differences. Table 1 is a presentation of the combined average-per cent agreement of the 400 subjects on the various pictures and adjectives and is comparable in a way to the Kent-Rosanoff table of reactions among 1000 subjects to the Free-

TABLE 3

*Combined average P.A.'s of 10 or over for the pictures according to the division*

| | COLLEGE DIVISION | HIGH-SCHOOL DIVISION | ART DIVISION |
|---|---|---|---|
| 1 | 34.4 | 30.0 | 23.9 |
| 2 | 16.4 | 15.5 | 13.1 |
| 3 | 25.9 | 28.0 | 26.1 |
| 4 | 40.9 | 29.6 | 29.0 |
| 5 | 31.4 | 26.2 | 17.6 |
| 6 | 34.8 | 21.9 | 21.0 |
| 7 | 30.1 | 13.1 | 10.2 |
| 8 | 17.3 | 15.1 | 15.1 |
| 9 | 16.6 | 10.9 | 13.8 |
| 10 | 34.1 | 25.9 | 25.1 |
| 11 | 29.7 | 20.7 | 17.4 |
| 12 | 23.2 | 20.8 | 20.0 |
| 13 | 26.1 | 19.3 | 26.7 |
| 14 | 29.2 | 17.8 | 25.2 |
| 15 | 29.5 | 32.1 | 24.7 |
| 16 | 18.8 | 18.6 | 22.8 |
| 17 | 28.9 | 21.2 | 15.0 |
| 18 | 21.8 | 10.8 | 20.7 |
| 19 | 27.4 | 20.1 | 25.5 |
| 20 | 17.8 | 15.9 | 13.2 |

Association test. The characteristic emotional reactions to every picture is given in table 2. In order to determine the characteristic emotional reactions to the pictures the criterion of average per cent agreement of 10 or over for an adjective was used. This same criterion is the basis of the next table which is a comparison of the combined P. A.'s of 10 or over for each picture according to the college, high-school, and art divisions.

The 400 subjects naturally fall within these three divisions; the 80 T. C. students made up the art-division, all the college students and high-school pupils comprised their respective divisions. It was found that an averaging of the P. A.'s of all adjectives for picture 1 showed that the highest agreement (8.1) was in the college division, the next highest (6.9) in the high-school division, while the art division was a close third (6.2); and in the case of picture 20, in the same order the combined average percentage agreements for all the adjectives were 9.1, 7.6, and 6.4. This fact then that the average P. A. for an emotional reaction to a painting-reproduction is highest for college students, and lowest for art-students (with high-school students just a little beyond the latter) is borne out in adding up the P. A.'s for the three divisions of 10 or over as set forth in table 3. The combined average per cent agreement for the college division was 26.7; for the high-school division, 20.7; and for the art division, 20.3.

While the average agreements range as high as 68.8 per cent (Table 3: picture 4—adjective 1) the average of the sum total of all the P. A.'s (average percentage agreement) is only 22.6 (based on criterion of P. A.'s of 10 or over). The reason for this apparently low grand average seems to lie in the unlimited choice from 23 adjectives of any adjective or adjectives for each picture. The subjects were not restricted to only one adjective for a picture. And then, some of the adjective-series bear a certain relationship to one another. Therefore, it is probable that if these factors were ruled out, the average percentage agreements would have ranged higher and may have doubled or trebled in many instances.

The parallelism of the three divisions is very interesting. The agreement, it will be remembered, among the high school pupils was much less than that among the college students, although it was a trifle more than that among the art students. Miss Lowell[2] found that in the affective reactions to lines the percentage agreement increased with intelligence and age.

[2] Marion P. Lowell: "Age Difference in Affective Reactions to Lines." M.A. thesis, Columbia University, 1926 (unpublished).

She came to the conclusion that at the age of twenty the esthetic-judgment becomes stabilized. Our results in affective reactions to painting reproductions parallel Miss Lowell's results in affective reactions to lines. The matter of stabilization of esthetic-judgment is questionable. The fact that the graduate arts groups at Teachers College (there were, however, some undergraduates in the group) gave a lower percentage agreement than the college-students, and even lower than the high-school pupils would seem to show that esthetic-judgment is subject even after twenty to considerable change. Just why the art-division reacted the way it did is difficult to answer. It might be that the old saying that an artist is a poor critic is an explanation. At any rate, it seemingly points to the fact that the esthetic-judgment is subject to training (after twenty) and even to a sensitive point for certain individuals as students in art who develop an acute esthetic-judgment. It may then be said that emotional reactions to lines and paintings have it in common that the percentage agreement of the judgments increases with intelligence and age but that in reactions to paintings it decreases (after twenty) with special acquaintance or training in the arts.

The close relationship between the results in the "free emotional reaction experiment" and in the experiment proper is rather important. Here is a new method probably that can be used in emotion-tests, in esthetic-tests, and as a "redintegration" indicator. When an individual is asked to look at a picture and state any reaction at all to it, he will wander off into his past experiences and will associate the emotion of past experiences with the present stimulus. And that is redintegrating. According to Professor Hollingworth, the esthetic-experience is a redintegrative one. This is borne out by the "free emotional reaction experiment." If this is true, then an excellent test for the detection of neurotic-tendencies, or faulty redintegrations, or emotional-instability, would consist of several painting reproductions in colors, the subject to be instructed to state any feeling or emotional reaction at all that the picture may evoke.

Since quantitative measurements are yielded in the study of emotional reactions to lines and to pictures, they might serve as a basis for an esthetic appreciation test. An *A. Q.* (esthetic quotient) might be found thereby.

## CONCLUSIONS

1. Emotional reactions to paintings can be measured qualitatively, and the reactions of different kinds and levels of people can be compared.

2. Four hundred art students, graduate students, college students, and high school pupils when asked to describe their emotional reactions to painting reproductions in colors according to a given list of twenty-three adjective (emotions) series, on the whole, behave very much alike.

3. In that case, the percentage agreement—considering P. A.'s of 10 or over—is 20.3 for the art groups; 20.7 for the high-school groups; and 26.7 for the college groups.

4. This can be interpreted as meaning that the percentage agreement increases with intelligence and age and is parallel to Marion P. Lowell's conclusions that in affective reactions to lines, the percentage agreement increases with age and intelligence. Furthermore it seems that not only is the esthetic judgment stabilized at the age of twenty (Lowell) but it is extremely susceptible after twenty to general and particular critical experience, and technical experience in the arts.

5. There is a striking relationship between the results obtained in the preliminary experiment where 11 subjects were instructed to give any emotional reactions at all aroused by the pictures, and in the experiment where the 400 subjects were asked to indicate their emotional reactions to the same pictures when provided with a list of adjectives.

6. The free emotional reaction experiment can be developed along several lines. It indicates that the esthetic experience is a redintegrative one. Hence, it might be used to detect faulty redintegration. Neurotic tendencies could probably be shown by this experiment.

7. Quantitative results obtained in a study of emotional reactions to lines and to pictures ought to be included in esthetic appreciation tests.

The results suggest that a test like this one could be developed as a group test to show a cross-section of the emotional life of individuals in that group. The test might have value as a social-intelligence test.

# A SCORE CARD OF PERSONAL BEHAVIOR

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We are continually faced with the problem of types of behavior or the method by which an individual adjusts to his environment. This is not entirely a problem of mental level. It is true that fundamentally level of intelligence is of prime importance but a measure of level of intelligence leaves much to be desired. In every community there are individuals who, because of certain characteristics other than mental level, are able to function adequately with a lower level of ability than their neighbors. It is in this respect that level of intelligence and degree of brightness fail to tell all regarding the individual's social efficiency. Having been faced with this dilemma the psychologist has turned his attention to rating scales of various types differing in degree of complexity and use. The literature is replete with scales of all sorts—some workable, others not. Behavior clinics are chiefly concerned with the individual's adaptation to his environment but have not had available a satisfactory objective scale to measure this. Space does not permit us to enter into an analysis of the previous scales in this article. We wish to offer, however, a personal-behavior score card as a means of evaluating the individual's adaptation to his environment or his worth as a social being irrespective of the factor of intelligence.

This score card was developed when it became paramount that we should have means for stating objectively the social adaptability of the individual. Since the announcement of the Behavior Score Card in the early part of last year, numerous requests have been received asking for more detailed information. In order to make the material immediately available the scheme is herewith described.

In obtaining reports of social adjustment we felt that we could no longer rely upon the unguided judgment of a reporter and that we could not actually compare the reports of two judges on the same facts. In other words, the personal equation was always such a prominent factor that it materially influenced results and particularly so when extended over a period of time. We were convinced that we could tell that one individual was "bad" and another "good" but we could not tell how bad or how good he was in comparison with the group. Or, if today he is "bad" is he tomorrow "worse" or "better"? No one could say definitely except in a generalized statement. It was also desirable to study a group of children over a period of time with periodic reports to determine their improvement or their regression. Obviously in order to do this textual or conversational reports could not be relied upon under the circumstances because of the desire to plot changes. The chance of the qualitative "good," "excellent," "poor," etc., meaning one thing one day and another the next, became immediately of significant importance.

An inspection of the available scales brought forward one outstanding defect which apparently affected the results. This was the necessity of judging the qualitative degree of the behavior. Objectivity was not a part of any existing scale. It is the same criticism that applied to the judging of intelligence and the subsequent development of the objective means of measuring the reaction of an individual under controlled situations. Progress was not made until the amount of judging was reduced and objective measures substituted.

Judges of behavior cannot agree except in gross measures. Given a free rein the difference varies with the looseness allowed. When certain specifications are given the validity perceptably rises. That is, we may judge that a person is five feet tall when standing alone, but we will be more apt to judge correctly if we have a five-foot rule in the immedite vicinity. Mental development is measurable when we have measures of accomplishment. That is, the ability to draw a square, make change, tell the date, walk upstairs unassisted, etc., all are indicative

of development. We are able to rate the subject's development upon the report of such items because they are objective measures. In behavior or social adaptation, too, there are objective measures of success or lack of success which may enable us to score the subject in relation to others of his group. It is just as possible to state objectively that a boy is "ignored and shunned" as it is to state that he can draw a square or that his word is "not to be relied upon" as it is to say that he can make change.

The present behavior score card is based upon several analyses of the individual as a reacting organism within his environment and has undergone numerous changes and modifications. These changes have been made in seminar discussion, as the result of actual use and upon the criticism and suggestions of numerous authorities. While not yet in what may be considered its ultimate form, it is probable that the only modification will be in the reduction of the number of items. It has been found workable and is offered with the hope that it will stimulate interest in this type of clinical study. Data are at hand on feeble-minded individuals in an institution, children in special classes for defectives, delinquent boys, and normal children. Articles dealing with these results will appear shortly.

The scores are obtainable from any individuals familiar with the subject. Preliminary results indicate a fairly high degree of correlation between different reporters. On a small group of cases the intercorrelation between four judges ranged from 0.50 to 0.80. As to reliability, results indicate that on a total of approximately 400 cases the coefficient of correlation between two surveys approximates 0.80. This must be considered quite high when it is appreciated that 16 reporters are included in the surveys. Repeated ratings on a group of 50 unselected cases show a very close agreement. This agreement is due to the objectivity of the system.

The following tentative directions are offered for the obtaining of scores on the personal-behavior score card.

It is imperative to find the individual who is best acquainted with the child being scored. It is also well to always indicate

who is doing the reporting. The general plan is to give the person who is reporting an extra copy of the card. Then explain to him something as follows:

> These pages contain an attempt to get at a measure of individuals in an entirely new way. You will note in glancing over the pages that we have the various main headings, such as Attitude of Others Toward Him, Sociability, and so on. These have been sub-divided and we have from 4 to 7 sub-headings under each main heading. Each sub-heading tells *something the child does*. We are anxious to know the child as he is right today and not as he was some time ago. Now we will take the first case and go over the whole card very carefully and slowly so that you will have time to read each item under the main heading. Let's take (give the name). Now look at Attitude of Others Toward Him. (Here you should read the various items). Now which act is most characteristic of (name)? That is, what *is* the attitude of others toward him? (If the reporter tends to give more than one thing, say "No, tell me just the one thing.")

Then make a cross or check mark in the proper column and proceed to the next heading and read it the same as above. Go very slowly through the entire card with the first child, reading as many as you think necessary. If you are familiar with the child challenge the reporter regarding what you think is obviously inaccurate. If the reporter tends to start telling you a long story merely tell him that you will be able to save time if he confines himself to the items on the card for from the entire report you will be able to form a picture of the child.

If the reporter is unable to say anything about the child place an "M" (median) some place in the column under the proper heading and when the score is being computed place a zero in the median score or the score of 3 as it is in most cases. If the items do not apply because the case exhibits no acts capable of scoring—as industry in a very young child—give an absolute score of zero.

The method of scoring has received constant attention but as yet we have not arrived at what we consider an entirely satisfactory method. It is desirable to have a score which will be expressive in itself and at the same time give the amount of dispersion necessary so that each individual will stand out in

relation to those in his group. Several methods have been employed all of which have given, in a measure, the results desired but there remains considerable work to be done with large groups of cases. The most satisfactory method seems to be the one arrived at as the result of over 1000 scores obtained on approximately 400 cases. The percentage of each item has been taken as being significant of the group and the scores allotted in direct ratio to the percentage of children performing the act. Until considerable additional material is at hand from other sources the announcement of a definite scoring method is withheld.

That the behavior, as charted by this method, has little relationship to mental level or degree of brightness is demonstrated by the fact that whatever method of scoring has been used the coefficient of correlation with Binet test age has at no time been higher than plus 0.25 and according to two methods has been negative. Correlation with I.Q. or degree of brightness is also very low.

The Personal Behavior Score Card follows:

ATTITUDE OF OTHERS TOWARD HIM
- Choose him as a leader
- Accept him as a leader
- Play with him only occasionally, not often
- Seek his companionship
- Ignore and shun him
- Accepted readily as one of group
- Butt of crowd, pick on him

SOCIABILITY
- Enjoys being by self to extent of being reclusive
- Seeks company of certain few
- Often sulky
- Adjusts self to social situation
- Quarrels, fights, etc. with companions

RELIABILITY IN GENERAL
- Can be left to own resources
- Initial word enough
- Must be given frequent attention
- Must be watched continually
- Requires only occasional check up

TRUTHFULNESS

Often does not tell the truth
Occasional falsehood
Not known to tell falsehoods
Word not to be relied upon
Falsifies but readily admits falsehood

ATTITUDE TOWARD OTHERS

Is cruel, a "bully"
Coöperates, is considerate of others
Makes the best of any situation
Rough but means well
Coöperates, is considerate, a leader

LANGUAGE AND LANGUAGE ATTITUDE

Profane, vulgar
Saucy, talks back
Always courteous, language good
Occasional flare up

PROPERTY ATTITUDE

Recognizes rights of others personally
Tries to guide others in recognition of personal rights
Actually purloins others property
Claims others property but given up
Gets others' property by unfair means—threats, unequal trades, etc.

ATTITUDE TOWARD SUPERIORS

Always complaining about something
Willingly carries out instructions
Grumbles regarding necessary tasks
Refuses to conform and has to be spoken to frequently
Never has to be spoken to and is courteous, respectful

ACTIVITIES

Willingly a member of group activities
Sought out to enter group activities
Generally plays games of individual nature
Enters into group play unwillingly
A leader in group sports and activities

INDUSTRIOUSNESS
- Interested in work at hand
- Always wants something different
- Carries tasks to satisfactory completion to best of ability
- Often becomes dissatisfied
- Must be given only few explanations and works well

WORK (NON-INDUSTRIAL)
- Most time refuses to work
- Works without direction
- Requires constant supervision
- Works with only occasional direction
- Works with only direction

INITIATIVE
- Begins new tasks readily upon suggestion
- Uses new methods of own accord with good judgment
- Never does more than necessary
- Sees something to be done and does it in an approved manner
- Never notices things to be done

PROPERTY
- Destroys own and others
- Careful of own and others
- Careless of everything
- Careful of own but not of others
- Exercises usual care

DISCIPLINE
- Deprivation of privileges enough
- Seldom requires discipline
- Responds to positive measures
- Special measures needed

Even a casual analysis will convince one that the utilization of the scheme will do much toward picturing the individual in a unique manner. It is extremely useful in order to present the characteristics of the subject which make for or militate against social adaptation. While no particular effort has been made to balance the admittedly social and anti-social traits it is patent that the two types may be easily isolated. With this information at hand the negative or positive reasons regarding social adaptation may be summated in a most effective manner.

The present personal-behavior score card then offers—

1. An objective method of evaluating the individual as a social being within his environment.

2. Being objective it eliminates judging as to social adaptability. Eliminating judgment it presents an advance over hitherto available rating scales.

3. The reliability is high indicating its usefulness as a method of follow-up in behavior studies.

4. Extended preliminary studies suggest that the fourteen major fields, consisting of 75 items, isolate the reasons for or against social adaptation irrespective of mental level or degree of brightness.

5. As a strictly clinical method of study it enables one to present additional valuable material in cases where most needed.

6. It may become extremely useful as a training method, for the decidedly social traits may be made objectives in the training of the individual.

# DYAD PREFERENCES AT DIFFERENT INTENSITIES

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In two studies, Valentine[1] has demonstrated the preference values for the various dyads of the chromatic scale. Foster, in his laboratory manual,[2] gives values obtained from American university students. In both of these researches, the experimenters attempted to play the tones with constant intensities. That their intensities approximated constancy is shown by the similarity of their series of preference values.

A number of years ago, Henry Cowell, the ultra-modern composer, in some unpublished work, became interested in varying the intensities when playing the various dyads. Although he had no quantitative way of doing this, he was reasonably certain that the softer the intensity, the higher would be the preference rating.

In order to repeat Mr. Cowell's work under more scientific conditions, the present writers employed a Duo-Art piano.[3] Blank rolls were perforated so that the dyads could be given in any desired order. Three intensities were used,—soft, medium, and loud. Although it might have been possible to employ the intensity holes on the Duo-Art, it was deemed easier to make use of the intensity levers. To play "soft," the intensity levers were all placed at "soft." For "medium," the levers remained unchanged with the exception of the extreme left one which was shifted to "dance." For "loud," the left lever was kept at "dance" and the other three levers were shifted to "loud."

[1] Valentine, C. W. Brit. Jour. Psych., 1913, 6, 190; 1914, 7, 118.

[2] Foster, Wm. S. Experiments in Psychology. New York, Henry Holt & Co., 1923.

[3] The writers wish to express their gratitude to the Sherman Clay Company of San Jose, Cal., for the loan of the Duo-Art.

The stimuli included the twelve chromatic dyads at the three intensities, that is, thirty-six tonal stimuli. The subjects were three classes of university students. The majority of the experiments were performed on a class of twenty. As a check, a different random order was used for two other groups of approximately the same size. The subjects were given papers ruled with thirty-six lines,—a 15-cm. line for each dyad stimulus. If a dyad was extremely pleasing, a check was to be placed at the extreme right of the line; if extremely displeasing, at the extreme left. Any degree of pleasure or displeasure could thus be indicated.

The dyads are designated by their bass; $c^1$ refers to the dyads which have middle c as a bass. For example, the major second of the octave $c^1$ is the interval bounded by middle c and the d just above. Preferences were ascertained for each octave except the lowest on the piano keyboard. Here the vocality was very poor. The order of preference from highest to lowest for the octave dyads beginning with $c^1$, a typical octave series, is as follows:

| | | | |
|---|---|---|---|
| 1 | 4th soft | 18.5 | mn. 6th medium |
| 2 | mj. 3rd soft | 20 | 5th medium |
| 3 | octave soft | 21.5 | mj. 2nd soft |
| 4 | tritone soft | 21.5 | octave loud |
| 5 | mn. 6th soft | 23.5 | 5th loud |
| 6 | mn. 7th soft | 23.5 | mn. 2nd soft |
| 7.5 | mj. 6th soft | 25.5 | 4th loud |
| 7.5 | mj. 3rd medium | 25.5 | mn. 6th loud |
| 9 | 5th soft | 27.5 | tritone loud |
| 10 | tritone medium | 27.5 | mn. 7th loud |
| 11 | mj. 3rd loud | 29 | mn. 3rd loud |
| 12 | mn. 3rd medium | 30 | mj. 2nd loud |
| 13 | mn. 3rd soft | 31.5 | mj. 7th medium |
| 14 | mj. 6th loud | 31.5 | mn. 7th medium |
| 15.5 | octave medium | 33 | mn. 2nd loud |
| 15.5 | mj. 6th medium | 34.5 | mj. 2nd medium |
| 17 | 4th medium | 34.5 | mn. 2nd medium |
| 18.5 | mj. 7th soft | 36 | mj. 7th loud |

The correlations between the orders of preference among the several series are all high.

| | $c^1$ | $c^2$ | $c^3$ | $c^4$ | c | C |
|---|---|---|---|---|---|---|
| $c^1$ | *0.83* | 0.91 | 0.91 | 0.87 | 0.71 | 0.76 |
| $c^2$ | 0.91 | *0.93* | 0.88 | 0.88 | 0.74 | 0.73 |
| $c^3$ | 0.91 | 0.88 | | 0.86 | 0.67 | 0.73 |
| $c^4$ | 0.87 | 0.88 | 0.86 | | 0.79 | 0.67 |
| c | 0.71 | 0.74 | 0.67 | 0.79 | *0.66* | 0.59 |
| C | 0.76 | 0.73 | 0.73 | 0.67 | 0.59 | |

These should read, "The order of preference for the thirty-six dyads in octave $c^1$ correlates with the order of corresponding dyads of $c^2$ at 0.91 (rank method), and with $c^3$ at 0.91," etc. The italicized correlations constitute retest reliabilities (three weeks apart). Note that $c^2$, the octave most played in music, has the highest reliability.

These reliabilities can be analyzed further.

$c^1$ with $c^1$ (retest).....0.83

$c^1$ medium intensity with its retest.....0.95
$c^1$ soft intensity with its retest.....0.73
$c^1$ loud intensity with its retest.....0.47

$c^2$ with $c^2$ (retest).....0.93

$c^2$ medium intensity with its retest.....0.91
$c^2$ soft intensity with its retest.....0.68
$c^2$ loud intensity with its retest.....0.89

c with c (retest).....0.66

c medium intensity with its retest.....0.78
c soft intensity with its retest.....0.42
c loud intensity with its retest.....0.23

Note that the medium intensities are the most reliable.

The dyads of octave $c^2$ were correlated with those of $c^2$ of a different random order using a different group of students. The correlation was 0.83. The dyads of this second random order, octave $c^2$, were given to two different groups of subjects with a correlation of 0.93.

In every octave, the soft intensity was preferred to the medium, and the medium to the loud. $c^2$ can be taken as typical. Where a preference of 15 cm. is the highest possible score, and 0 cm. the lowest, the loud intensity ratings were 4.4, the medium 5.9 and the soft 9.5 with an average at 6.6 cm.

The writers decided that their medium intensity probably coincided most closely with the intensities which would normally be used when giving the test as Valentine and Foster must have given it. Accordingly, correlations were made between their orders and the ones offered in this paper. Although the writers used the "absolute scale" method, and Foster the method of "paired comparisons," $c^1$ of the present study correlated with the latter's series at 0.92; with Valentine's 1913 study at 0.86, and with his 1914 study at 0.84.

## CONCLUSIONS

1. The dyad preferences are rather constant from octave to octave, especially around the center of the piano range.

2. Retest reliabilities are high, especially for the octave starting with $c^2$. Reliabilities for medium intensity are higher than for loud or soft.

3. The order of presentation of stimuli apparently makes little difference in the preference value.

4. Soft intensities have a higher preference value than medium, and medium than loud. That is, the softer a dyad, the higher is its preference value.

5. The medium intensities of this study give high correlations with previous studies of Valentine and Foster.

# NOTES AND NEWS

## NINTH INTERNATIONAL CONGRESS OF PSYCHOLOGY

The Ninth International Congress of Psychology will be held at Yale University in New Haven, Connecticut, U. S. A., probably in August or September, 1929.

The officers of the Congress are as follows: President, J. McKeen Cattell of New York; Vice-president, James R. Angell of Yale University; Secretary, Edwin G. Boring of Harvard University; Treasurer, R. S. Woodworth of Columbia University; Foreign Secretary, Herbert S. Langfeld of Princeton University; Executive Secretary, Walter S. Hunter of Clark University; Chairman of the Program Committee, Raymond Dodge of Yale University; Chairman of the Committee on Arrangements, R. P. Angier of Yale University.

Besides these men the National Committee includes J. E. Anderson, University of Minnesota; Madison Bentley, University of Illinois; E. A. Bott, University of Toronto; H. A. Carr, University of Chicago; Knight Dunlap, Johns Hopkins University; S. W. Fernberger, University of Pennsylvania; William McDougall, Duke University; W. B. Pillsbury, University of Michigan; C. E. Seashore, University of Iowa; L. M. Terman, Stanford University; E. L. Thorndike, Columbia University; H. C. Warren, Princeton University; M. F. Washburn, Vassar College; R. M. Yerkes, Yale University.

This is the first meeting of the Congress in America. The previous meetings have been as follows: Paris, 1889; London, 1892; Munich, 1896; Paris, 1900; Rome, 1905; Geneva, 1909; Oxford, 1923; Groningen, 1926. It is expected that the Congress in the United States will be truly international in character. The Americans hope that the appointment of some foreigners for lecturers and lectureships can be arranged near the time of the Congress, so that foreign attendance can be increased and international solidarity within psychology furthered still more. Most appointments of this kind at American universities would have to apply only to psychologists who speak English.

"Teaching as a Fine Art" will be the keynote of the Eighth Annual Ohio State Educational Conference which the College of Education, Ohio State University, will conduct at Columbus on April 12, 13 and 14. Last year, with an attendance record of 4500, the Seventh Annual Conference quite shattered all previous registration figures. The Executive

Committee for the 1928 Conference anticipates that the "new record a year" tradition will be continued this year.

As in the past, the sectional meetings, held throughout Friday, the second day of the Conference, will feature the three-day session. This provision for group meetings by school people of the State whose interests and problems are similar has met with such evident approval that meetings must now be scheduled, in many instances, in both the morning and afternoon for certain of the sections. In order to avoid the overlapping which necessarily occurs when the sectional program is extended, some of the group meetings have been scheduled this year for Thursday afternoon.

The National Society of College Teachers of Education, meeting at Harvard University, February 27–29, 1928, has announced for the first of its Round Tables: Educational Psychology. What shall be the basic courses together with their content in the field of Educational Psychology? Professor Walter F. Dearborn will preside and the discussion will be led by Drs. Arthur I. Gates, Lewis M. Terman and Charles H. Judd.

At the recent Columbus meeting of the American Psychological Association it was decided that the Association should withdraw from any plan of certification of consulting psychologists. The withdrawal of the Association from the certification plan was so complete that it included a reimbursement of the certification fee to members already certified upon the return of the certification certificate.

Concurrently with this action the Association acted favorably on hearty coöperation with state and other commissions in their efforts to require high standards of training and skill of all those engaged in the making of psychological examinations.

## BOOK REVIEWS

L. W. KLINE AND F. L. KLINE. *Psychology by Experiment.* Ginn and Company, Boston, 1927. Pp. xii + 339.

The authors of this *Psychology by Experiment* state so clearly the aim and method of their work that one cannot do better than to use their words: "This text is written with the conviction that psychology can best be approached under experimental conditions afforded by a laboratory equipped and set apart for such purposes." "The present laboratory manual has been planned and arranged with the belief that while students are learning the fundamental laws of the science they should have ample opportunity to observe the continuity in its development, that such a course is not only logical and practicable, but is as necessary to understanding science as are similar courses in chemistry, biology, and physics in their respective fields." "The student of a science should become familiar at the outset with the assumptions, general premises, and types of reasoning involved in its investigations and in the formulation of its laws and principles. Such considerations need be neither pretentious nor complex, but they should be sufficient to make clear the foundations, the scope, and the limitations of the science in question."

The experiments are grouped into chapters in accordance with the generally accepted major problems of the science. The headings with the number of experiments grouped under each are: Movement, 13; Sensations, 27; Attitude, 11; Retention and Association, 13; Perception, 14; Learning, 7; Memory and Imagination, 11; Reasoning, 6; and Affective Reactions, 5. It is not expected that every student will perform every experiment. Each section opens with a number of skillfully selected quotations and a detailed topical outline. These are followed by several pages of introduction to the topic considered in the chapter. The result is that instead of a number of discrete experiments the bearing of each experiment upon the others and upon the general topic is brought out. Procedure is clearly suggested. Discussion of results is shaped by a dozen or more questions bearing on the experiment. An extensive bibliography follows each chapter and a glossary gives the meaning of all technical phrases. No elaborate apparatus is required for any experiment. The few unusual pieces can easily be constructed in any shop.

Few teachers of psychology will disagree with the program of the authors of this Manual. In practice, however, elementary psychology still tends to be taught by word of mouth rather than by demonstration.

In supplying this excellent manual the authors have cleared many difficulties from the path of the teacher who wishes to make his work concrete. The teacher who wishes to give his demonstrations an applied twist will find that many of the experiments lend themselves to this aim. The exercises appear to be well designed as the starting point of discussions of practical applications of psychology.

F. H. LUND. *Psychology, The Science of Mental Activity.* A. G. Seiler, New York, 1927. Pp. xx + 488.

The author states the aim and general position of this elementary text in the following sentences. "With the many "isms" which burden modern psychology it would appear desirable to have general texts which avoid controversial aspects and combine the best results from the different fields without regard to the point of view held by the workers." "Well established facts from older texts which fit into the general picture of mental and physical activities here outlined are incorporated along with more recent developments. In the main the discussion is couched in terms of the stimulus and response pattern because of its clearness and its general acceptance in modern psychology."

The general arrangement of topics can perhaps be best shown by comparison with Woodworth's widely known text. Except for minor differences the order of chapters is much the same. Lund gives chapters to Language and Meaning and to Belief and Confidence. Association and Imagery, combined in one chapter in Woodworth, are here given separate chapters.

Psychology is defined as "the science of the activities of the individual." "It is broad enough to include behaviorism and to take advantage of the facts gained from introspection as well as what has been learned through physiological studies in support of both introspective and behavioristic data."

The general content and method are that of the typical eclectic text. Novel features are the section on purposive activity and the extensive use made of the principle of redintegration. The nervous system is given an unusually detailed anatomical treatment. Aside from this difficult chapter this text will be of interest to those who wish an eclectic text somewhat simpler than that of Woodworth.

D. E. PHILLIPS. *An Elementary Psychology. (Revised Edition.)* Ginn and Company, Boston, 1927. Pp. 417.

The sub-title, "Suggestions for the Interpretation of Human Life and Conduct," best characterizes this elementary text. The primary aim of the author is to fill the beginning student with enthusiasm to know and with a desire to solve the problems of human life and conduct. The reader is specifically warned that the author is not writing for the scien-

tific critic but for young people who must begin with an interpretation of life as they find it. Rigorous definitions and distinctions are to be avoided in the interest of an open, inquiring, attitude of mind.

This aim, unusual in the writer of an elementary text, results in an unusual book. Half the twenty chapters have headings not usually found in elementary texts, for example, Human Nature Simplified; Life's Accummulated Experiences; Character; Heredity and Environment; The Power of Thinking; The Subconscious Mind; Psychological Suggestion; Reflections on this Human Conflict.

An elementary text must be evaluated in terms of its aim. The present text must be judged in terms of its ability to arouse interest and improve character. Without doubt the typical student will find it much more interesting than the conventional elementary text. A student is likely to read to the end of a chapter beginning in the style typical of the book, "The average man, as he journeys on the bosom of a mighty river winding through mountains and valleys, comprehends not and thinks little of the thousands of streams, subterranean and otherwise, that combine to produce this sublime work of nature. So, too, human life is a majestic river that ever bears us on to the hidden sea of eternity." The danger is that the mass of psychological literature will seem cold and barren to the student who enters psychology through such a text.

WILLIAM R. WILSON,
*Ohio State University.*

*The Classification of Pupils in Private Schools.* By the Committee on Intelligence Tests of the Private School Teachers' Association, Philadelphia, Pennsylvania, Pamphlet No. 2, 1927, 24 pp.

This pamphlet gives a report on the distribution of mental ages, chronological ages, educational ages and intelligence quotients in schools affiliated with the Private School Teachers' Association of Philadelphia. Twenty-six schools and 4115 pupils were studied and an interesting array of facts gained. The data was analyzed and the report written by Dr. Agnes L. Rogers of Bryn Mawr College.

Several interesting comparisons with public schools are made. Tables of intelligence quotients lead the author to conclude that "the evidence is abundant that private schools have a superior selection of students . . . . " (p. 9). However there is a great deal of difference between private schools. The median mental ages of the pupils in the fourth grades of several of these schools range from 9–5 to 12–6, and in the tenth grades the range is from 15–6 to 18–11. The private schools find that their pupils are, on the average, younger chronologically, older mentally, and more advanced scholastically than pupils of corresponding grades in the public schools. Scholastically their pupils

are doing about what their mental superiority indicates they ought to do. The private schools have two faults in common with the public schools. The first is that there is a wide overlapping of scholastic achievement between grades, and the second is the lack of homogeneous groups from the standpoint of mental ages. The range of mental ages within a grade is about as wide as it is in public schools where steps have not been taken to correct the situation.

The pamphlet ought to provide private school authorities with a considerable amount of help in standardizing their schools with respect to admissions and achievement. Certainly it shows that many types of children are destined to be sadly out of place unless private schools choose with discretion, for it is doubtful whether parents can choose schools as well as schools can choose pupils.

CHARLES W. ODELL. *Scales for Rating Pupils' Answers to Nine Types of Thought Questions in General Science, American History, Civics, and English Literature.* ¶ University of Illinois Bureau of Educational Research, Urbana, Ill., 1927.

The scales contained in these booklets are composed of answers written by pupils from high schools in the state of Illinois and rated by a number of experienced teachers. Nine types of questions were used: analysis, cause or effect, comparison, criticism, discussion, explanation, relationship, reorganization, summary. Each booklet contains a scale of ten answers to each type of question, making 90 answers in each booklet. For example in the booklet on civics one finds a series of ten answers to a question of an analytical type, viz., "What are the purposes for which a political party is formed?" These ten answers are rated on a scale of values from zero to ten. After each answer a criticism of the answer is given showing why it is considered a poor or a good answer. It is expected that the scale will be used in the same fashion as scales of English composition, e.g., the Hillegas scale. The teacher who is scoring answers to analytical questions in civics will compare the answer of a pupil with those on the scale for analysis in civics until the one is found which it most nearly resembles in merit, and then give the pupil's answer the rating of that scale specimen. English is not to be considered except as it may alter the thought of the written answer.

We are in need of some objective devices for scoring answers to thought questions, and work on this problem is to be commended. No data are given indicating how much more reliable these scales are than the personal judgments of the teachers. The criticisms which follow each answer in the scale are, of course, largely concerned with showing the inadequacy of the answers to the specific question. Whether they will provide a general means of criticising or not seems to be the crux of the matter. Specifically, will pointing out the failure to include "carpet

baggers" (in answer to a request to "criticize the reconstruction policy followed after 1865") aid one in discovering the faults in answer to "criticise the Monroe Doctrine?" We shall await proof of the value of these scales with much interest.

STUART M. STOKE,
*Ohio University.*

S. L. PRESSEY, L. C. PRESSEY, D. A. WORCESTER, O. R. CHAMBERS, J. FERGUSON, H. J. ARNOLD, J. A. SEATON, AND H. C. MARTIN. *Research Adventures in University Teaching.* Public School Publishing Company. Bloomington, Illinois, 1927. Pp. vi + 152.

To the conscientious educator waste in education is a very serious problem. A sane and successful educational program must therefore take cognizance of many of the principles that have come to be associated with child accounting. The specific applications that shall be made of these principles in the field of higher education are perhaps open to debate. Nevertheless, the elimination of waste and the salvaging of the educational misfit are problems at all levels of instruction. Adequate solutions are dependent upon thorough-going surveys of the conditions that prevail in institutions of higher learning. Conscientious educators will therefore welcome a recent volume which reports a portion of the results of a four-year program of research regarding college and university problems.

The topics dealt with in this volume are varied, involving both instructional and administrative matters, and various subjects of instruction. Sixteen problems are considered. Since only four of them are actual teaching adventures, the alluring title is slightly misleading.

Problem I summarizes an effort to deal with the crucial differences between good and poor students by means of personal interviews and case study methods. Two groups of students are considered; one group conspicuously successful in academic endeavor and a contrasting group painfully below average in achievement. The attempt was to find clues which might lead to more complete understanding of the factors making for college success or failure. Despite the limitations of technique significant differences were apparently disclosed.

The second problem describes results obtained with a class of probation students who were given a course on "How to Study." The members of this group were dealt with by: (1) personal interview for diagnosis and guidance, (2) lectures on methods of work, (3) laboratory periods for practice of such method under expert observation and guidance, and (4) drill on special weak points. The subsequent findings evidence marked improvement on the part of members of the probation group. This improvement seems to be more than temporary.

Problem III presents case studies of probationary students with

notes regarding present status and remedial work. It is usually assumed that the student entering high school has mastered the subjects taught in the elementary school.. What must we conclude then with reference to the following disclosures: "James scored at the 6th grade in spelling and speed of reading, at the 5th grade in arithmetic and English and at the 2nd grade in handwriting. . . . . He was attempting university work on a little better than 5th grade general preparation" (p. 27).

It would appear that James' case is not unique. "The average for all tests (in arithmetic) shows 24 per cent of the students scoring below the eighth grade average" (p. 109). In division 40 per cent or more of the students average below the eighth grade norm (p. 109). Opinions may differ regarding measures that should be taken to cope with this situation but there can be no valid differences of opinion with regard to the desirability of facing the actual facts rather than the assumed.

In section II Worcester reports an effort to apply certain principles of child accounting to courses in educational psychology as given in three teacher-training institutions. He found marked heterogeneity among the students pursuing these courses as regards preliminary courses, teaching experience, prerequisite information, etc. Subsequent chapters of the volume deal with the college student's emotional and characterological development.

The authors' adventures naturally raise numerous questions. For example, in problem X it is reported that each of 100 college women was found to have one or more unsolved personal problems. Neither college classes nor personal contacts with members of the college staff were assisting to any adequate extent in the solution of these personal problems. No doubt such problems are of vital concern both to the student and to the university. Nevertheless, the extent to which the university is justified in devoting its energies to the solution of students' personal problems is an open question.

In problem XI we are informed that the academic features of college life are not making a vital appeal to the students. "The student sits around, smokes, gossips, or talks athletics" (p. 90). "There is much wasted time" (p. 90). What should be done about it? One wonders what the writer of this chapter would say to the following remarks recently made concerning the problem of "Who Should Go to College."

" . . . . we must look out, not only for the benefit of the individual, but for that of the whole (student) body. In other words, the man who drags down the standards of his associates is doing an injury to the whole student body. Therefore we must keep our minds fixed, not only on what is best for the individual, but also on the effect upon the whole college. We have always had to shoot deserters, even though it is for the benefit of the deserter not to be shot" (A. Lawrence Lowell in *Sch. and Soc.*, May 28, 1927, p. 620).

"No matter how good our teaching may be each student must take the responsibility for his own education and the sooner he finds that out the better for him" (Pres. Adeylotte in *Sch. and Soc.*, October 1, 1927, p. 409).

"Any one who can do the work should be allowed to go to college and for the very distinct reason that the American system of education is not simply a matter of training boys and girls in getting some knowledge and technique, but it is a system of sifting and winnowing the population for leaders" (Herbert Hoover, quoted in *Sch. and Soc.*, October 1, 1927, p. 411).

One of the most constructive chapters (problem XVII) reports the operation and results obtained from a university experimental class in elementary psychology. An informal laboratory-project method was employed in teaching a class of 71 students. The group was given entire freedom to develop the work of the course in cooperative and socialized fashion; there was freedom of movement about the room and discussion among the students was encouraged. The results proved to be highly favorable. However, the inferences of the writer are not convincing. In the opinion of the reviewer the teaching ability of the instructor was probably a prime factor in effecting the salutary results. The reviewer doubts that the average college instructor possesses sufficient skill to justify widespread attempts to handle university classes merely because Miss Pressey demonstrated that it *could be done*.

In justice to the writers of the volume under consideration the fact should be mentioned that they submit no dogmatic formulas for solving the multitudinous problems which they unearth. They seem fully to realize both the limitations of their techniques and the danger of hasty generalization. It is clear that such problems as: (1) definition of college functions, (2) limiting of the college to its real functions, (3) identification of those who are both able and willing to profit by a college course, and (4) adequate provision for this group, are not to be solved in an offhand manner or by *a priori* methods. The satisfactory solution of such problems is dependent first of all upon searching study of the conditions which now beset the institution of higher learning. The volume under review represents a beginning of such study. It has distinct merit despite the limitations of the techniques employed—limitations which the authors fully recognize.

HARVEY C. LEHMAN,
*Ohio University.*

TRUMAN LEE KELLEY. *Interpretation of Educational Measurements.* World Book Company, Yonkers-on-Hudson, 1927. xiii + 363 pp.

In the words of the author, this book on the interpretation of test scores has been written "with a view to a more sane, a more widespread,

and at the same time a more penetrating use of such measures." And in the writing of such a book, Truman L. Kelley has rendered the educational world a great service. A keen observer, a leading statistician, a careful student of measurement, and a man intelligently interested in the welfare of our boys and girls, has put into one small volume of ten chapters the important results of his labors and his observations. From the Historical Survey of Mental Measurement in chapter one through the Classified and Graded Lists of Tests in chapter ten the reader recognizes the painstaking work of a master mind.

In chapter two the author states that "the future enhanced respect for our profession rests largely upon a greater accuracy and moderation in our prognoses." The suggestion is made that "a probable error attached to an intellect in such a manner that it proclaims itself whenever the imagination runs rampant would be serviceable as a part of a counselor's equipment," and later we are told that "the chief contribution of this text is an emphasis of the universality of error in our mental measurements, of the importance of measures of reliability, and an effort to show how to obtain and use them." Under "Measurement of Group Achievement" we find some excellent advice for the giving of a test, scoring papers and the making of tabulations and computations. The statistical treatment suggested is clear and simple.

Chapter four, "The Measurement of Individual Achievement," should be carefully studied by everyone charged with the administration of test programs in our public school systems, and pages 85 to 96 should become the constant companion of the person responsible for the classification of children. This study of illustrative cases is especially illuminating.

The keynote of chapter five, "The Determination of Individual Idiosyncrasy," is given in a proposed article for "a teachers credo:" "I shall respect and endeavor to utilize to a social outcome idiosyncrasy wherever found." The list of traits "more or less independent of each other" found on page 122, and "a minimal list of traits to be studied for the understanding of typical school children" given on pages 123 to 125 deserve very careful consideration.

Speaking of these two chapters in the editor's introduction, Lewis M. Terman says: "Indeed, in the judgment of the editor, these chapters are classics hardly to be matched in the literature of educational measurements."

Pages 133 to 145 of chapter six, "Experimental Studies of Certain Inequalities of Development," are especially valuable for counselors.

One of the outstanding contributions of the chapter entitled "Elementary Statistical Procedures," is the clear presentation of the meaning of the probable error of a score. To fully appreciate chapter eight the reader must be well grounded in statistical method, and although

there may be an inclination to disagree with some of the author's conclusions, yet the careful methods used in arriving at the results carry conviction. The following statement is made on page 208:

"To summarize, we have for a complete age population a situation somewhat as follows:

"The community between different intelligence tests is about 95 per cent.

"The community between intelligence tests and achievement batteries is about 90 per cent.

"The community between intelligence tests and reading tests is about 92 per cent.

"The community between intelligence tests and arithmetic tests is about 88 per cent."

"The author says of chapter nine, "Judgments as to Excellence of Tests" that "the rankings here given are the consensus of opinion of seven judges, of whom the writer is one," and later he states: "Fallible as these rankings are, the writer believes that they constitute a radical improvement upon the judgments of teachers, principals, and superintendents generally."

In the last chapter we find a mine of most valuable information concerning tests judged worthy of consideration in chapter nine. The material was gathered by the author through careful and persistent effort, much correspondence and the exercise of great patience. This chapter alone is a great contribution to education.

The book, as a whole, in the estimation of the reviewer, is one of the most significant and useful contributions to the field of measurement which we have had in some time.

A. B. Sias,
*Ohio University.*

Arthur Kenyon Rogers. *Morals in Review.* The Macmillan Company, New York, 1927. 456 pp.

*Morals in Review* takes the influential moralists in the western world, from Socrates down to the twentieth century, and isolates their significant and lasting contributions with a view to throwing light upon present-day ethical discussion. No attempt is made to offer a complete history of ethics, this task being regarded as too ambitious if not impossible for a single writer because of the multiplicity of factors involved. Beginning with Socrates the author traces the varying programs of "the good life" through Plato and Aristotle, the Epicureans and Stoics, Thomas Aquinas as a representative of the Church, Hobbes and Spinoza as typical of modern naturalism, Cudworth, More, Clarke, Wollaston and Cumberland as standing for the ethics of reason, Shaftesbury, Hutcheson, Hume and Adam Smith as holding to the ethics of

sentiment, Mandeville as an example of moral realism, Butler, Reid, Price and Martineau as advocating the ethics of conscience, Locke, Paley and Hartley as inclining toward theological utilitarianism, Bentham, James Mill, J. S. Mill, Bain and Sidgwick as leaders of the later utilitarianism, Kant, Fichte, Hegel and Schopenhauer as exponents of metaphysical ethics in Germany, Bradley and Green as exponents of a similar metaphysical ethics in England, and lastly, Spencer, Huxley, Comte, Clifford, Stephen and Guyau as typical of the recent scientific ethics. The main purpose in the study is to point out, analyze and appraise the basic ethical concepts of these outstanding leaders of ethical schools and movements. Illuminating comparisons are also made. The author reveals an intimate acquaintance with the sources and presents his interpretative material in a clear and concise manner. The treatment is objective and impartial, and should be valuable to teachers and pupils working on the history of ethics.

In a postscript the author draws a few interesting conclusions: (1) There is a tendency among moralists to enforce and amplify "the moral precepts of the ethicist's own age and condition of society" (p. 447). (2) There is a "conspicuous absence in ethical philosophy of any wholehearted admission of the need of experimental initiative in conduct" (p. 448). (3) There is a converging tendency among all moralists, whether traditionalists, idealists, or "scientific" ethicists, to accept *social welfare* in some sense as the standard or norm of morality. (4) Social welfare must be restated and redefined if it is to be rescued from its character of abstractness and remoteness on the one side, and of security and smugness on the other. Our political and social problems are awaiting a more concrete statement of social welfare in terms of personal liberty and personal realization.

WALTER S. GAMERTSFELDER,
*Ohio University.*

CARTER V. GOOD. *The Supplementary Reading Assignment.* Baltimore, Maryland, Warwick and York, 1927.

This book describes a series of tests designed to evaluate two methods of studying certain school subjects. The method of experiment employed was the familiar parallel-group method. In the investigation one group read textbook assignments only, the other, both the textbook and certain supplementary readings. Both groups were measured by the same tests in each case. The following abilities were chosen for measurement as the outcome of reading procedures:

1. Range and accuracy of information
2. Problem-solving
3. Outlining
4. Reproduction of ideas
5. Permanency of retention

The data were secured chiefly from undergraduate students of education at a large middlewest university.

The results in brief indicate what experience has already suggested. On the tests requiring detailed reproduction and accuracy of information the group which studied a shorter assignment proved as able or were superior to the group reading widely. In like manner, the students who read widely, though less efficient in the above-mentioned ability, has secured a considerable range of information. In problem-solving the group reading extensively was superior. The tests in outlining showed that the students who read extensively were superior, as were they also in regard to the permanency of retention.

Other sections of the book indicate by minor investigation, reviews of previous experiments, and discussion the effect of speed and interest on reading ability. In these nothing new is contributed. A discussion on the relationship between intellectual level and extensive and intensive study procedure substantiates the known fact that extensive reading profits most the more intelligent reader.

These results indicate, according to the author, that the character and length of reading assignments must vary with the purpose of the reading. A logical summary is that both textbook and supplementary reading assignments are in general best for the learner. The investigation has proved valuable in making available scientific data where none have existed. It seems to answer certain questions in the procedures to be employed in the teaching of classes, making of assignments, the writing of textbooks, and the testing of results. As a venture in this field it should prove valuable.

In a measure the preface and title are misleading when they suggest the application of the results to the problem of teaching reading in the grades. The book does not deal with methods of handling supplementary assignments in reading classes. It reports a series of experiments indicating the value of requiring of high school and college classes what is often called "collateral reading."

The physical make-up of the book as to size of margin, paper and typography are unfortunately not of as high quality as the content deserves. An occasional failure in proof reading adds to this impression of inadvertence in regard to mechanics.

JAMES HERBERT BLACKHURST. *Investigations in the Hygiene of Reading.* Baltimore, Maryland, Warwick and York, 1927. Pp. 63.

This investigation was undertaken by Professor Blackhurst in an attempt to answer certain fundamental questions in regard to the printing of reading materials for children. As he says in his preface, it seems amazing that so little attention should have been paid to the hygiene of reading. Both possible impairment of vision and decrease in reading

efficiency are involved. Answers to these questions were sought in the experiments performed:

1. What size of type is most readable in each of the first four grades for children of normal age?
2. How many millimeters of leading are most desirable in each of the first four grades for children of normal age?
3. What length of line is most desirable in each of the first four grades for children of normal age?
3. Is regularity of beginning and ending lines an advantage to first grade children of normal age?

The investigation is limited to that period of elementary school life when children are learning the mechanics and first skills in reading. The size of type, leading, and length of line were studied in grades 1–4 inclusive, while the effect of marginal regularity was studied in the first grade only. The experiments performed were carefully controlled in order to secure as far as possible a single variable.

In all but determining the amount of leading, the results secured admit of clear and definite recommendations. In this one item Blackhurst considers his findings inconclusive for grades one and two. This leaves an important phrase in printing reading materials yet to be explored. The present study brings to bear true scientific evidence in an important field which changes previous conceptions noticeably. The findings are not in agreement with those of previous investigations, many of which are reported in the historical review given in chapter 1 of the book. That the study is an important contribution for use of all interested in making successful reading materials for children is evident.

EINAR A. HANSEN,
*Ohio University.*

## NEW BOOKS AND PAMPHLETS RECEIVED*

Books and pamphlets for review should be sent to James P. Porter, Department of Psychology, Ohio University, Athens, Ohio.

*Ability Grouping in Junior High School.* HEBER HINDS RYAN AND PHILIPINE CRECELIUS. Harcourt, Brace & Co., New York. 223 pp.

*Behavior Levels and Mental Hygiene.* GUSTAV. A. JAEDERHOLM. Illinois Department of Public Welfare. Chicago, Ill. 13 pp.

*The Constant and Variable Occupations of the United States in 1920.* R. H. OJEMANN. University of Illinois Bulletin, Vol. XXIV, No. 39. University of Illinois, Urbana, Ill. 25 cents. 47 pp.

*Educational Guidance in a Mental Health Program.* MRS. DORA KEEN MOHLMAN. Department of Public Welfare, C. H. Jenkins, Director, Chicago, Ill. 10 pp.

*Every Man a Brick.* MERRITT M. CHAMBER. Public School Publishing Company, Bloomington, Ill. 100 pp.

*Fundamentals in Visual Instruction.* WILLIAM H. JOHNSON. The Educational Screen, Chicago, Ill. 104 pp.

*How to Succeed in College.* WILLIAM F. BOOK. Warwick and York, Baltimore, Md., 192 pp.

*A Laboratory Study of the Reading of Modern Foreign Languages.* G. T. BUSWELL. Publications of American and Canadian Committees on Modern Languages, Vol. 2. The Macmillan Company, New York City. 100 pp.

*Making Citizens of the Mentally Limited.* HELEN DAVIS WHIPPLE. Public School Publishing Company, Bloomington, Ill. 374 pp.

*Manual of Psychiatry.* 6th Edition. AARON J. ROSANOFF. John Wiley & Sons, New York City. 697 pp.

*New York Experiments with New Type Modern Language Tests.* BEN D. WOOD. Publication of American and Canadian Committee on Modern Languages, Vol. 1. Macmillan Company, New York. 339 pp.

*Occupational Groups and Child Development.* STUART M. STOKE. Harvard University Press, Cambridge, Mass. 92 pp.

*1000 and One: The Blue Book of Non-Theatrical Film.* The Educational Screen, Chicago, Ill. 128 pp.

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*Mention here does not preclude further comment.

*Personnel Service in Relation to Employer and Employee.* Division of Industrial Sciences, Iowa State College, Ames, Iowa. 44 pp.

*The Philosophy of Education.* HERMAN HARRELL HORNE. Macmillan Company, New York. 295 pp.

*The Problem Child in School.* MARY B. SAYLES. Commonwealth Fund, Division of Publications, New York City. 280 pp.

*Psychologie Expérimentale.* H. PIÉRON. Librarie Armand Colin, 103, Boulevard Saint-Michel, Paris. 220 pp.

*The Purpose and Scope of Visiting Teacher Work.* HOWARD W. NUDD. Reprint Series No. 3. Commonwealth Fund, 50 E. 42nd Street, New York. 30 pp.

*Recent Developments in the Social Sciences.* C. A. ELLWOOD, CLARK WISSLER, R. H. GAULT AND OTHERS. J. B. Lippincott Company, Philadelphia, Pa. $3.50. 427 pp.

*Report of the Commission on Length of Elementary Education.* Supplementary Educational Monographs. University of Chicago Press, Chicago, Ill. 165 pp.

*Report of Mental Health of LaSalle, Peru and Oglesby.* Institute for Juvenile Research. H. M. Adler, Director. Department of Public Welfare of Illinois. 53 pp.

*Social Science Research Council—Annual Report, 1927.* 50 E. 42nd Street, New York. 46 pp.

*Some Extra Curricular Problems of the Classroom.* BERNARD GLUECK. Reprint Series No. 5. Commonwealth Fund, 50 E. 42nd Street, New York, 15 pp.

*The Science of Religion.* LEWIS GUY ROHRBAUGH. Henry Holt & Company, New York. $3.00. 291 pp.

*Second Annual Report of the Commission on Scholastic Aptitude Tests, 1927.* College Entrance Examining Board, New York City. 37 pp.

*A Study of Mental Testing in Relation to Anthropology.* BEATRICE BLACKWOOD. Mental Measurement Monographs, Serial No. 4, 1927. Williams & Wilkins Company, Baltimore, Md. 120 pp.

*Team Work in the Prevention of Crime.* RALPH P. TRUITT. Reprint Series No. 4, Commonwealth Fund, 50 E. 42nd Street, New York. 20 pp.

*Test Construction in Less Standardized Subjects Illustrated by the Richards Biology Test.* OSCAR W. RICHARDS. 14 Mellen Street, Cambridge, Mass. 6 pp.

*That Mind of Yours.* DANIEL BELL LEARY. J. B. Lippincott Company, Philadelphia, Pa. $1.75. 226 pp.

*Understanding Human Traits.* ALFRED ADLER. Translated by Walter Beran Wolfe. Greenberg, Publisher, 112 E. 19th Street, New York. $3.50. 286 pp.

*The Visiting Teacher.* JANE F. CULBERT. Joint Committee on Method of Preventing Delinquency, 50 E. 42nd Street, New York. 9 pp.

## Directory of American Psychological Periodicals (*Continued*)

**Journal of Personnel Research**—Baltimore: Williams & Wilkins Co. Subscription $5.00. 500 pages approximately. Edited by Walter V. Bingham, Lewis L. Thurstone, and Clarence S. Yoakem. Monthly.

**Genetic Psychology Monographs**—Worcester, Mass.: Clark University Press. Subscription $7.00 per volume. Two volumes per year, 600 pages each. Edited by Carl Murchison and an international co-operating board. Monthly. Each number one complete research. Child behavior, differential and genetic psychology. Founded 1925.

**Psychological Abstracts**—Princeton, N. J. Subscription $6.00. 600 pages ann. Edited by W. S. Hunter. Monthly. Abstracts of psychological literature. Founded 1927.

**Mental Measurement Monographs**—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Founded 1925. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research.

**Studies in Psychology and Psychiatry**—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Founded 1926. Edited by Edward A. Pace. Published without fixed dates, each number a single research.

**Journal of General Psychology**—Worcester, Mass.: Clark University Press. Subscription $7. 600-700 pages annually. Edited by Carl Murchison and an international co-operating board. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

## Directory of American Psychological Periodicals

**American Journal of Psychology**—Ithaca, N. Y.: Morrill Hall.
Subscription $6.50. 600 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

**The Pedagogical Seminary and Journal of Genetic Psychology**—Worcester, Mass.: Clark University Press. Subscription $7. 700 pages annually. Edited by Carl Murchison and an international co-operating board. Quarterly. Child behavior, differential and genetic psychology. Founded 1891.

**Psychological Review**—Princeton, N. J.: Psychological Review Company.
Subscription $4.25. 480 pages annually.
Bi-monthly. General. Founded 1894. Edited by John B. Watson.

**Psychological Bulletin**—Princeton, N. J.: Psychological Review Company.
Subscription $5. 720 pages annually. Psychological literature.
Monthly. Founded 1904. Edited by Samuel W. Fernberger.

**Psychological Monographs**—Princeton, N. J.: Psychological Review Company.
Subscription $5.50 per vol. 500 pp. Founded 1895. Ed. by Shepherd I. Franz.
Published without fixed dates, each issue one or more researches.

**Psychological Index**—Princeton, N. J.: Psychological Review Company.
Subscription $1.50. 200 pp. Founded 1895. Edited by Walter S. Hunter.
An annual bibliography of psychological literature.

**Journal of Philosophy**—New York; 515 W. 116th St.
Subscription $4. 728 pages per volume. Founded 1904.
Bi-weekly. Edited by F. J. E. Woodbridge and Wendell T. Bush.

**Archives of Psychology**—Sub-Station 84, N. Y.: Archives of Psychology.
Subscription $6. 500 pp. ann. Founded 1906. Ed. by R. S. Woodworth.
Published without fixed dates, each number a single experimental study.

**Journal of Abnormal Psychology and Social Psychology**—Albany, N. Y.
Subscription $5. Boyd Printing and Publishing Co. Edited by Morton Prince in co-operation with Floyd H. Allport.
Quarterly. 432 pages annually. Founded 1906. Abnormal and Social.

**Psychological Clinic**—Philadelphia: Psychological Clinic Press.
Subscription $2.50. 288 pages. Ed. by Lightner Witmer. Founded 1907.
Without fixed dates (9 numbers). Orthogenics, psychology, hygiene.

**Training School Bulletin**—Vineland, N. J.: The Training School.
Subscription $1. 160 pp. ann. Ed. by E. R. Johnstone. Founded 1904.
Monthly (10 numbers). Psychology and training of defectives.

**Comparative Psychology Monographs**—Baltimore: Williams & Wilkins Co.
Subscription $5. 500 pages per volume. Edited by W. S. Hunter.
Published without fixed dates, each number a single research.

**Psychoanalytic Review**—Washington, D. C.: 3617 10th St., N. W.
Subscription $6. 500 pages annually. Psychoanalysis.
Quarterly. Founded 1913. Ed. by W. A. White and S. E. Jelliffe.

**Journal of Experimental Psychology**—Princeton, N. J.
Psychological Review Company. 480 pages annually. Experimental.
Subscription $4.25. Founded 1916. Bi-monthly. Ed. by Madison Bentley.

**Journal of Applied Psychology**—Baltimore: The Williams & Wilkins Co.
Subscription $5.00. 400 pages annually. Founded 1917. Bi-monthly.
Edited by James P. Porter, Ohio University, Athens, Ohio.

**Journal of Comparative Psychology**—Baltimore: Williams & Wilkins Co.
Subscription $5. 500 pages annually. Founded 1921.
Bi-monthly. Edited by Knight Dunlap and Robert M. Yerkes.

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